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BUREAU OF SHIPS GROUP TECHNICAL INSPECTION REPORT

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By 1st Lt. AFSWP Date 24 April 51

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TECHNICAL INSPECTION REPORT

OVERALL SUMMARY

I. Target Condition After Test.

- (a) Drafts after test; list; general areas of flooding, sources.

The drafts are reported as follows:

	Draft forward	Draft aft	List
Before Test A.	9'-6"	9'-6"	0°
After Test A.	10'-5" (port)	12'-0" (port)	0°-41 (port)
	9'-5" (stbd)	10'-0" (stbd)	Trim by stern 0°-16'

As a result of a structural longitudinal crack in the port slab just below the waterline, there is a gradual seepage into three of the port tanks and the after peak tank. The draft readings after the test given above are for the period 1500, 2 July, and represent approximately 30 hours of slow flooding. The average draft at 1500 on 4 July was 13.2 feet and the list was about 8 degrees, 10 minutes to port. Water was washing through the dock on the port side. C deck, port wing, was flooded by water entering an open ventilation duct.

Areas of flooding: Numbers 2, 4, 6, and 8 main tanks, after peak tank and "C" deck in port wingwall, to approximately 7 feet above deck level.

Sources: Small crack along port wingwall just below the waterline and minor crack in bottom of number 6 and 8 main tanks.

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(b) Structural damage.

HULL

The port wing wall has suffered the most damage. The exterior face is darkened and the heavy timber fender work is lightly charred. Topside fittings show the effects of the blast attack. A machinery hatch on the port wingwall at A-deck level is carried away. The mushroom-type ventilators are intact, life lines are down, light standards are broken or badly bent. The port and starboard catwalks overhanging the dock floor at A-deck level are destroyed.

The major damage appears in the form of longitudinal, tensile cracks in the concrete slabs of both wingwalls, A-deck, B-deck in the port wingwall, the framing system in the port wall between A and B decks, and along the dock floor. The concrete is spalled in some places on the frames and the reinforcing bars are exposed. The port slab is cracked, longitudinally, just below the waterline, frames 18 to 55. This crack is open over about one-fourth of its length and has allowed the flooding of port side tanks 4, 6, and 8, and the after peak tank. These structural cracks are of significance only where the crack is open sufficiently to allow seepage from one watertight sub-division to another.

MACHINERY

No comment.

ELECTRICAL

The control house located on "A" deck, top of starboard wingwall was completely destroyed by blast pressure. Had the electrical equipment associated with docking control been installed it would have been carried away with this structure.

Structural failure of port wingwall caused secondary damage to motors and controllers for fresh water pumps, sanitary pumps, portable welding generator and refrigeration compressors located on port "C" deck due to flooding of this area.

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(c) Other damage.

HULL

The main engines for power and light are undamaged. The flooding in way of the port tanks has caused the loss of all pumps controlling fresh water and the sanitary system. The refrigeration space is flooded. There is no other significant damage to equipment.

MACHINERY

Refrigerating equipment, and fresh and salt water pumps on C deck, port wing, were damaged by flooding. Two ventilation blowers (crew's head and captain's stateroom) were damaged by blast pressure entering the open vent ducts.

ELECTRICAL

The two main diesel driven generators, distribution switchboard, power and lighting distribution panels and diesel engine auxiliaries located on "C" deck in starboard wingwall were undamaged and operable. Secondary damage due to flooding of power and lighting distribution panels, motors and motor controllers for fresh and salt water pumps, air compressors, refrigeration compressors and portable welding generator located on "C" deck in port wingwall rendered these systems inoperable.

The electrical equipment associated with docking control suffered only minor damage. Due to the drydock being approximately 60% complete only a small amount of this equipment was installed.

Fire control and gunnery are not applicable as this dock has no armament.

II. Forces Evident and Effects Noted.

(a) Heat.

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HULL

The port faces of both wingwalls are darkened and the port side fenders are charred to a depth of about 1/16 inch. The shadow effects indicate that the heat emanated from a source on a relative bearing of 280 degrees.

MACHINERY

Paint on exposed deck machinery was scorched and blistered.

ELECTRICAL

This drydock was subjected to a wave of radiant heat coming from approximately 12 degrees forward of the port beam and 14 degrees elevation of sufficient intensity to char exposed woodwork to a depth of 1/16 inch. However, this caused no damage to any electrical equipment.

(b) Fires and explosions.

HULL

A small section of the creosote-treated timbers that form the framework of the catwalks is burned. This section is in the forward face of the port wingwall. There is no other evidence of fire and there were no explosions.

MACHINERY

No evidence.

ELECTRICAL

There were no fires or explosions.

(c) Shock.

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HULL

The shock had no significant effect upon the dock.

MACHINERY

No evidence.

ELECTRICAL

There was no evidence of damage to any electrical equipment as a result of shock.

(d) Pressure.

HULL

The pressure wave apparently originated at a point nearly broad on the port beam. The effect of the pressure was to strain the wingwalls, A deck, port B deck, and the dock floor sufficiently to open hairline cracks, for the most part, throughout the length of the dock. A few of the cracks are well defined. The concrete framing, especially in the port wall shows signs of transverse racking strains, with fairly well defined cracks and some spalling of concrete. The wingwalls were exposed internally to the blast as well as externally through several non-airtight accesses on A deck level, such as the damaged main engine room access and several mushroom ventilators. The blast has damaged joiner work in the interior and created further failures in decks and the wingwall. The effects of diffraction and reflection must also be considered as contributing to the damage to the inboard slabs of the wingwalls.

MACHINERY

Blast pressure entering open ventilation ducts wrecked the ventilation set in the crew's shower, and damaged the casing of the ventilation set in the Captain's stateroom.

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ELECTRICAL

This drydock was subjected to a pressure wave coming from approximately 12 degrees forward of the port beam of sufficient magnitude to crack the port wingwall, carry away control house and deflect 2-1/2 inch pipe stanchions on which capstan control switches were mounted.

Pressure entering port and starboard "B" decks through open ventilation systems, generally dislodged equipment in crew's berthing and messing spaces, galley, laundry and sick bay areas.

(e) Any effects apparently peculiar to the Atomic Bomb.

HULL

Disregarding radioactivity, the intense heat radiation was the only effect peculiar to the Atom Bomb.

MACHINERY

None.

ELECTRICAL

Radiant heat and blast pressure.

III. Results of Damage.

Effect on machinery, electrical and ship control.

HULL

There is very little machinery or electrical equipment installed and the dock is designed to be towed. There is no significant damage to any of these items.

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MACHINERY

Refrigerating equipment and water pumps are inoperable from flooding. One ventilation set (crew's shower) is out of commission. None of this damage would have occurred if the ventilation ducts had been closed. However, it should be noted that these ventilation systems are normally open during operations of the vessel.

ELECTRICAL

The main diesel generator plant, distribution switchboard, power and lighting distribution system and diesel engine auxiliaries located on the starboard wingwall were undamaged and operable. The secondary damage due to flooding of motor operated pumps and compressors, their controls and regulating equipment as noted in paragraph I rendered them inoperable. However, this flooding could have been easily controlled had the dewatering system been installed and a damage control party able to operate.

The loss of the control house which normally houses docking control and communications center, would seriously impair the efficient operation of this dock. However, by means of jury rig telephones and local operation of pumps and valves this dock could continue to function in emergencies.

(b) Effect on gunnery and fire control.

HULL

No comment.

MACHINERY

No comment.

ELECTRICAL

This drydock has no armament.

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(c) Effect on watertight integrity.

HULL

The watertight integrity is impaired by cracks in the concrete shell and in some of the concrete watertight bulkheads. However, any leakage through the cracks may be easily controlled by portable submersible pumps, providing that the dock can be manned.

MACHINERY

No comment.

ELECTRICAL

All personnel stationed on topside would have suffered casualties as a result of radiant heat and bomb blast pressure.

The habitability of the drydock has been impaired due to flooding of "C" deck in port wingwall, rendering the fresh water pumps, sanitary pumps, and refrigeration machinery inoperable. However, had the de-watering system been installed and operable, the flooding could have been easily controlled. Blast damage in crew's messing and berthing spaces was such as to render them not livable without repairs, all of which were within the capacity of the docks force.

(d) Effect on personnel and habitability.

HULL

The habitability of the ship is impaired to a slight degree by the flooding of pump rooms. Had the dock been manned and equipped, the flooding could have been prevented.

MACHINERY

It is not believed that there would have been any personnel casualties below decks. Habitability is adversely affected.

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by loss of refrigeration and of fresh and salt water service.

ELECTRICAL

No comment.

(e) Total effect on fighting efficiency.

HULL

The cracks in the concrete are not believed to materially affect the longitudinal strength of the vessel. The seepage through the port slab is well within the capacity of the ship's pumps.

MACHINERY

None, except for adverse effect on habitability (see III (c) above).

Note this vessel is not self-propelled.

ELECTRICAL

This drydock has no armament. Its efficiency as a drydock has been considerably reduced from an electrical view-point due to the loss of the control house, which if completed would have housed the necessary controls and communications for operation of the dock.

IV. General Summary of Observers' Impressions and Conclusions.

HULL

No comment.

MACHINERY

The ventilation ducts left open inadvertently on this vessel give an indication of what might occur on other vessels

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(notably destroyers) with low ventilation intakes or exhausts, if exposed to attacks of this nature during normal operation.

ELECTRICAL

This drydock was subjected to a flash of radiant heat, followed by an air blast pressure of considerable magnitude. Due to the nearness of this dock to the center of the blast, damage received is not unusual considering that rendered to other vessels in the same proximity. The electrical damage suffered by this dock is well within the capacity of the forces afloat to repair. Had a complete crew been onboard and the de-watering system been installed the flooding could have been controlled and electrical equipment on "C" deck in port wingwall would not have been impaired. It is the opinion of the observer that had the electrical installation been complete very little additional damage would have resulted, except for the electrical equipment housed in the control house which would have been completely destroyed.

V. Preliminary Recommendations.

HULL

None.

MACHINERY

Provision should be made for preventing damage to machinery from water entering through a vent duct, in cases where such ducts are low.

ELECTRICAL

None.

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TECHNICAL INSPECTION REPORT

SECTION I - HULL

GENERAL SUMMARY OF HULL DAMAGE

The ARDC 13, is a floating drydock, constructed of reinforced concrete with a capacity of 2800 tons. Overall length is 389 feet, width 84 feet and height 40 feet.

The dock consists, principally of three sections; the hull, which consists of side, bottom and dock floor (C Deck) slabs, 5 3/4 to 6 inches thick; and the port and starboard wing walls, each containing an intermediate (B) deck at midheight and a top (A) deck. The wing walls are 5 1/2 inches thick, B deck is 5 inches thick and A deck is 6 1/2 inches thick. Transverse framing, also of reinforced concrete, is provided every six feet.

The hull is divided into eight watertight compartments, four on either side of the centerline, plus a fore and after peak tank, each of which is divided into two separate tanks.

The ARDC 13 is new construction, her structure being rushed to completion the last part of March, 1946, for participation in Operation Crossroads. The Bureau of Yards and Docks reports that none of the military features were installed, nor the main discharge pumps or cranes, and only one anchor windlass was provided. Otherwise, the dock was essentially complete insofar as required to perform its function as a target ship.

I. Target Condition After Test.

- (a) Drafts after Test; list; general areas of flooding, sources.

The drafts are reported as follows:

	Draft forward	Draft aft.	List
Before Test "A"	9' 6"	9' 6"	0

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	Draft forward	Draft aft.	List
After Test "A"	10' 5" (Port)	12' 0" (Port)	0°-41 (Port)
	9' 5" (Stbd)	10' 0" (Stbd)	Trim by stern 0° - 16'

As a result of a structural longitudinal crack in the port slab just below the waterline, there is a gradual seepage into three of the port tanks and the after peak tank. The draft readings after the test given above are for the period 1500, 2nd July, and represent approximately 30 hours of slow flooding. The average draft at 1500 on 4 July was 13.2 feet and the list was about 8 degrees, 10 minutes to port. Water was washing through the dock on the port side.

(b) Structural damage.

The port wing wall has suffered the most damage. The exterior face is darkened and the heavy timber fender work is lightly charred. Topside fittings show the effects of the blast attack. A machinery hatch on the port wingwall at A deck level is carried away. The mushroom-type ventilators are intact, life lines are down, light standards are broken or badly bent. The port and starboard catwalks overhanging the dock floor at A deck level are destroyed.

The major damage appears in the form of longitudinal, tensile cracks in the concrete slabs of both wingwalls, A deck, B deck in the port wingwall, the framing system in the port wall between A and B decks, and along the dock floor. The concrete is spalled in some places on the frames and the reinforcing bars are exposed. The port slab is cracked, longitudinally, just below the waterline, frames 18 to 55. This crack is open over about one-fourth of its length and has allowed the flooding of port side tanks 4, 6, and 8, and the after peak tank. These structural cracks are of significance only where the crack is open sufficiently to allow seepage from one watertight subdivision to another.

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(c) Other damage.

The main engines for power and light are undamaged. The flooding in way of the port tanks has caused the loss of all pumps controlling fresh water and the sanitary system. The refrigeration space is flooded. There is no other significant damage to equipment.

II. Forces Evident and Effect Noted.

(a) Heat.

The port faces of both wingwalls are darkened and the port side fenders are charred to a depth of about 1/16 inch. The shadow effects indicate that the heat emanated from a source on a relative bearing of 280 degrees.

(b) Fires and explosions.

A small section of the creosote-treated timbers that form the framework of the catwalks is burned. This section is in the forward face of the port wingwall. There is no other evidence of fire and there were no explosions.

(c) Shock.

The shock had no significant effect upon the dock.

(d) Pressure.

The pressure wave apparently originated at a point nearly broad on the port beam. The effect of the pressure was to strain the wingwalls, A deck, port B deck, and the dock floor sufficiently to open hairline cracks, for the most part, throughout the length of the dock. A few of the cracks are well defined. The concrete framing, especially in the port wall shows signs of transverse racking strains, with fairly well defined cracks and some spalling of concrete. The wingwalls were exposed internally to the blast as well as externally through several non-airtight accesses on A deck level, such as the damaged main engine room access and several mushroom ventilators.

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The blast has damaged joiner work in the interior and created further failures in decks and the wingwall. The effects of diffraction and reflection must also be considered as contributing to the damage to the inboard slabs of the wingwalls.

- (e) Any effects apparently peculiar to the Atomic Bomb.

Disregarding radioactivity, the intense heat radiation was the only effect peculiar to the Atom Bomb.

III. Results of Damage.

- (a) Effect on machinery, electrical and ship control.

There is very little machinery or electrical equipment installed and the dock is designed to be towed. There is no significant damage to any of these items.

- (b) Effect in gunnery and fire control.

No comment.

- (c) Effect on watertight integrity.

The watertight integrity is impaired by cracks in the concrete shell and in some of the concrete watertight bulkheads. However, any leakage through the cracks may be easily controlled by portable submersible pumps, providing that the dock can be manned.

- (d) Effect on personnel and habitability.

The habitability of the ship is impaired to a slight degree by the flooding of pump rooms. Had the dock been manned and equipped, the flooding could have been prevented.

- (e) Total effect on fighting efficiency.

The cracks in the concrete are not believed to materially affect the longitudinal strength of the vessel. The seepage through

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the port side slab is well within the capacity of the ships pumps.

IV. General Summary of Observers' Impressions and Conclusions.

No comment.

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DETAILED DESCRIPTION OF HULL DAMAGE

A. General Description of Hull Damage.

This vessel sustained structural damage in the form of concrete cracks which are distributed throughout the framing system, shell and wing slabs, "A" and "B" deck levels, and the dock floor slab. This damage appears to be the result of air blast and pressure, with the greater amount of damage appearing in the port faces of the wing slabs, indicating that the attack came from almost directly off the port beam. General views of the exterior are shown on pages 43 to 58 , inclusive.

A crack running along the port water line has allowed seepage of sea water to slowly flood the after and amidships spaces on the port side below the waterline.

This damage is not considered to have impaired the usefulness of the vessel, or significantly affected its strength, inasmuch as the majority of the damage consists of clean tensile cracks in the concrete ranging in width from hairline to approximately 1/4 inch. (Photos 1916-2, 1914-11, 1914-4, 1916-1, 1963-5, pages 61 , 62 , 63 , 64 , and 65).

B. Superstructure.

The structural damage appears to be in general more intense on the port side. Longitudinal cracks extend on A deck for about 70 percent of its length, both port and starboard, at approximately the midwidth of the 10 foot wide deck. (Photos 1914-4, 1916-1, page 63 , and 64). Spalling of concrete appears deeper on the starboard side, however, especially around hatch openings and ventilators.

Rail stanchions on the port A deck are bent inboard. Those on the starboard A deck are bent outboard. Part of the forward port and starboard inclining ladders are blown down (Photos 1964-6, 1963-11, page 66 , and 67). The wooden cover of the walkway overhanging the inboard face of both wingwalks at A deck level is carried away and its heavy timber frame work is generally weakened and some sections are demolished. (Photos 1962-10, 1963-12, pages

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68 , and 39). Ventilators remained intact; life lines are broken, bent, or blown away. Light standards are broken and bent and wiring is stripped in many places. One main engine room hatch is missing from the port wingwall, apparently blown over the side. (Photo 1964-2, page 70). The athwartships catwalk amidships, is demolished. (Photos 1962-7 and 9, pages 71 , and 72).

All of the above damage is attributable to air blast.

Two small pieces of timber on the forward face of the port wing wall are burned. There is no other evidence of fire.

C. Turrets, Guns and Directors.

Not applicable.

D. Torpedo Mounts, Depth Charge Gear.

Not applicable.

E. Weather Deck.

The A deck slab which is the top cover for the wingwalls, contains longitudinal cracks over its entire length. The principal crack in the port wall, A deck, is the most severe and has caused spalling of the concrete in some areas. (Photos 1914-4, 1916-1, 1964-1 and 1914-12, pages 63 , 64 , 73 , and 74). The dock floor slab, on C deck, suffered damage throughout its length. This damage is in the form of longitudinal tensile cracks 1/16 to 1/8 inch in width running about three feet on each side of the centerline. There is also a crack about three feet inboard of the starboard wall extending from frame 10 to 25 and from 39 to 57. Plank flooring covering the propellor pits at the stern has been blown away (Photos 1962-11, 1964-3, pages 75 , and 76).

The usability of A and C decks is not hampered. Cracks on the docking level may interfere with the proper operation of the dock if the cracks extend through the thickness of the concrete, however, caulking to stop excessive leakage could be readily accomplished.

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Parts of a torpedo tube and spoon from some other vessel were found on the stern. (Photo 1963-2, page 77).

F. Exterior Hull. (Port and Starboard Wingwalls).

The exterior face of the port wall was darkened by radiated heat and the extensive timber fender system is charred to a depth of about 1/16 inch. (Photo 1964-10, page 78). There is a well defined crack running almost the length of the deck in line with the connection of the wall to B deck. There is a small crack extending through the port shell slab about six inches below the waterline running between frames 18 and 55. The crack was reported leaking over about one fourth of its total length. Outside of this one crack, the underwater damage is considered to be relatively minor.

The inboard face of the starboard wingwall is darkened from exposure to radiation from the top of the wall to about one half the distance to the dock floor.

The inboard face of the port wall amidships contains longitudinal cracks running four to five feet from the top of the wall, and at about midheight (Photo 1914-11, page 62). There is a continuous set of cracks running about five feet above the floor on the starboard wall (Photos 1916-2, 1963-5, pages 61 , and 65).

There is no apparent damage to the starboard shell slab. The bottom is reported to have a few cracks in way of tanks six and eight with a very slight amount of seepage evident. Otherwise the underwater hull is in good condition.

G. Interior Compartments.

The interiors of the port and starboard wingwalls, housing the operating machinery, living quarters, stores spaces and ships, have been exposed to the blast through the mushroom type ventilators on top of the walls. Interior joiner bulkheads in the living spaces are down. Considerable debris is scattered about B deck.

The framing system is moderately damaged throughout the port side, cracks appearing at approximately between the A and B

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deck levels (Photos 1914-6, 1914-7, 1914-10, pages 79 , 80 , and 81). On the starboard side, only the wing frames were affected. These have fine structural cracks about four feet above the B deck level. The port wing wall has two large areas that are over stressed. Structural, longitudinal cracks run between frames 25 and 40 at about B deck level, and about three feet below A deck. Structural bulkheads between frames 19 to 44, port, on B deck, are badly damaged. Concrete here has spalled, exposing the reinforcing bars. The watertight integrity of these bulkheads is impaired. (Photos 1914-8, 1914-5, pages 82 , and 83).

None of the normal operating machinery was installed, such as the main discharge pumps and cranes. One anchor windlass was provided. The power source consisted of two 100 k.w. diesel generators. A few machinery items, such as air compressors and refrigerators were aboard. None of this equipment was damaged by blast or shock. One ventilator fan assembly was demolished in the crews space, B deck, port wingwall (Photo 1914-9, page 84). The failure of structural bulkheads in the port wingwall, B deck level, has reduced the watertight integrity between frames 19 and 44. However, this is not considered as significant.

Due to the fact that the dock was left unattended for the first 36 hours, the crack in the port side slab just below the waterline allowed the flooding of the aft peak tank and the three after tanks to port of centerline. This flooding was sufficient to cause the loss of pumps controlling fresh water and the sanitary system. The refrigerated space is also flooded. As a result of this flooding damage the habitability of the dock was considerably reduced.

H. Armor decks.

Not applicable.

L. Interior Compartments (Below Waterline).

See item G.

J. Underwater Hull.

See item F.

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K. Tanks.

The hull is divided into eight main tanks, four port and four starboard, with peak tanks bow and stern which can be divided into two separate tanks each by equalizing valves. The port side slab is cracked just below the waterline, running aft from number two tank through number six and eight and extending into the stern peak tank. Tanks four, six and eight and the stern peak tank were filled by seepage through this crack during the first 36 hours, creating an 8 to 10 degree list to port. This small leakage had a very minor effect upon the operation of the dock.

None of the 8000 gallons of diesel fuel oil in the docks tanks was contaminated.

L. Flooding.

See item K.

M. Ventilation.

One fan assembly in on overhead vent tube was demolished by the blast (Photo 1914-9, page 84). The damage to light wooden joiner bulkheads and disarrangement of fixtures is apparently due, in part, to the entry of the blast wave through the ventilation system.

N. Ship Control.

No damage.

O. Fire Control.

Not applicable.

P. Ammunition Behavior.

No ammunition aboard.

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Q. Ammunition Handling.

No ammunition aboard.

R. Strength.

The structure of this concrete floating dry dock may have been subjected to higher loads than those assumed for purpose of design. Since concrete has a low tensile strength it is considered good design practice not to count on it to resist tensile loads. Indication of overstressing can be recognized by the width of the cracks, and concrete spalling. Viewed from these accepted concepts it may be stated that the hull girder strength of this vessel sustained by very slight damage.

S. Miscellaneous.

The Bureau of Yards and Docks Interim Report for Test "A" includes a rather comprehensive set of damage sketches.

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TECHNICAL INSPECTION REPORT

SECTION II - MACHINERY

GENERAL SUMMARY OF MACHINERY DAMAGE

I. Target Condition After Test.

- (a) Drafts after test; list; general areas of flooding, sources.

C deck, port wing, was flooded by water entering an open ventilation duct.

- (b) Structural damage.

No comment.

- (c) Other damage.

Refrigerating equipment, and fresh and salt water pumps on C deck, port wing, were damaged by flooding. Two ventilation blowers (crew's head and captain's stateroom) were damaged by blast pressure entering the open vent ducts.

II. Forces Evidenced and Effects Noted.

- (a) Heat.

Paint on exposed deck machinery was scorched and blistered.

- (b) Fires and explosions.

No evidence.

- (c) Shock.

No evidence.

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(d) Pressure.

Blast pressure entering open ventilation ducts wrecked the ventilation set in the crew's shower, and damaged the casing of the ventilation set in the Captain's stateroom.

(e) Any effects apparently peculiar to the Atom Bomb.

None.

III. Effects of Damage.

(a) Effect on machinery and ship control.

Refrigerating equipment and water pumps are inoperable from flooding. One ventilation set (crew's shower) is out of commission. None of this damage would have occurred if the ventilation ducts had been closed. However, it should be noted that these ventilation systems are normally open during operation of the vessel.

(b) Effect on gunnery and fire control.

No comment.

(c) Effect on water-tight integrity and stability.

No comment.

(d) Effect on personnel and habitability.

It is not believed that there would have been any personnel casualties below decks. Habitability is adversely affected by loss of refrigeration and of fresh and salt water service.

(e) Total effect on military efficiency.

(c) above). None, except for adverse effect on habitability (see III

NOTE: This vessel is not self-propelled.

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IV. General Summary of Observers' Impressions and Conclusions.

The ventilation ducts left open inadvertently on this vessel give an indication of what might occur on other vessels (notably destroyers) with low ventilation intakes or exhausts, if exposed to attacks of this nature during normal operation.

V. Any Preliminary General or Specific Recommendations of the Inspecting Group.

Provision should be made for preventing damage to machinery from water entering through a vent duct, in cases where such ducts are low.

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DETAILED DESCRIPTION OF MACHINERY DAMAGE

A. General Description of Machinery Damage.

(a) Overall condition.

No machinery was damaged by Test "A" except the exhaust fan in the crew's shower space. Machinery on "C" deck in port wing, except anchor windlass, was damaged by salt water immersion due to flooding through an open ventilation duct incident to the test.

(b) Areas of major damage.

The C deck of the port wing was flooded through open ventilation ducts.

(c) Primary cause of damage in each area of major damage.

Flooding.

(d) Effect of target Test "A" on overall operation of machinery plant.

Loss of refrigeration, fresh water and salt water service due to flooding.

B. Boilers.

Not applicable.

C. Blowers.

Not applicable.

D. Fuel Oil Equipment.

No damage.

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E. Boiler Feedwater Equipment.

Not applicable.

F. Main Propulsion.

Not applicable.

G. Reduction Gears.

Not applicable.

H. Shafting and Bearings.

Not applicable.

I. Lubrication System.

Not applicable.

J. Condensers and Air Ejectors.

Not applicable.

K. Pumps.

(a) Feed pumps.

Not applicable.

(b) Circulating pumps.

Undamaged.

(c) Condensate pumps.

Not applicable.

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(d) Fire pumps.

Not applicable.

(e) Lub oil pumps.

Not applicable.

(f) Fuel oil pumps.

Undamaged.

(g) Other pumps.

The two fresh water pumps and the two salt water pumps on C deck, port wing, are damaged by flooding and are inoperable. They are apparently undamaged mechanically.

L. Auxiliary Generators.

Not applicable.

M. Propellers.

Not applicable.

N. Distilling Plant.

Not applicable.

O. Refrigerating Plant.

The two installed refrigeration units and spare compressor were flooded by water entering an open ventilation duct, and are inoperable. They are apparently undamaged mechanically.

P. Winches, Windlasses, and Capstans.

Undamaged. The anchor windlass had been operated since Test "A", and functioned normally.

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Q. Steering Engine.

Not applicable.

R. Elevators, Ammunition Hoists, Etc.

Not applicable.

S. Ventilation.

(a) Fans and motors.

A fan in the crew's shower, port wing, was torn off the motor shaft. The motor was torn loose from its securing brackets and is hanging by the electric power lead. See photo No. 1914-9, page 84. (W.T. cover topside was not closed). Other fans, which had covers closed, were not damaged.

(b) Foundations and mountings.

The motor of the fan in the crew's shower was torn out of its securing brackets - see above.

(c) Heaters.

None.

(d) Miscellaneous.

The fan casing for the ventilation blower in the captains stateroom was damaged by the blast pressure.

T. Air Compressors.

The air compressors and their motors were damaged by flooding, and are inoperable. They are apparently undamaged mechanically.

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U. Diesels.

Undamaged. One diesel generator was operated under load after Test "A", and functioned normally. The other diesel generator shows no apparent damage on visual inspection.

V. Piping.

No damage.

W. Miscellaneous.

(a) Laundry machine.

Undamaged.

(b) Cold water fountain.

Undamaged.

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TECHNICAL INSPECTION REPORT

SECTION III - ELECTRICAL

GENERAL SUMMARY OF ELECTRICAL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

1. Drafts after test: Not observed.

2. Lists: Not observed.

3. Areas of flooding: Numbers 2, 4, 6, and 8 main tanks, after peak tank and 'C' deck in port wingwall, to approximately 7 feet above deck level.

4. Sources: Small crack along port wingwall just below the waterline and minor crack in bottom of number 6 and 8 main tanks.

(b) Structural damage.

1. The control house located on 'A' deck, top of starboard wingwall was completely destroyed by blast pressure. Had the electrical equipment associated with docking control been installed it would have been carried away with this structure.

2. Structural failure of port wingwall caused secondary damage to motors and controllers for fresh water pumps, sanitary pumps, portable welding generator and refrigeration compressors located on port 'C' deck due to flooding of this area.

(c) Damage electrical.

1. The two main diesel driven generators, distribution switchboard, power and lighting distribution panels and

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diesel engine auxiliaries located on 'C' deck in starboard wingwall were undamaged and operable. Secondary damage due to flooding of power and lighting distribution panels, motors and motor controllers for fresh and saltwater pumps, air compressors, refrigeration compressors and portable welding generator located on 'C' deck in port wingwall rendered these systems inoperable.

2. The electrical equipment associated with docking control suffered only minor damage. Due to the drydock being approximately 60% complete only a small amount of this equipment was installed.

3. Fire control and gunnery are not applicable as this dock has no armament.

II. Forces Evident and Effects Noted.

(a) Heat.

This drydock was subjected to a wave of radiant heat coming from approximately 12 degrees forward of the port beam and 14 degrees elevation of sufficient intensity to char exposed woodwork to a depth of 1/16 inch. However, this caused no damage to any electrical equipment.

(b) Fires and Explosions.

There were no fires or explosions.

(c) Shock.

There was no evidence of damage to any electrical equipment as a result of shock.

(d) Pressure.

1. This drydock was subjected to a pressure wave coming from approximately 12 degrees forward of the port beam of sufficient magnitude to crack the port wingwall, carry away control

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house and deflect 2-1/2 inch pipe stanchions on which capstan control switches were mounted.

2. Pressure entering port and starboard 'B' decks through open ventilating systems, generally dislodged equipment in crews berthing and messing spaces, galley, laundry and sick bay areas.

(e) Any effects apparently peculiar to the Atom Bomb.

Radiant heat and blast pressure.

III. Effects of Damage.

(a) Effect on electrical and docking control.

1. The main diesel generator plant, distribution switchboard, power and lighting distribution system and diesel engine auxiliaries located on the starboard wingwall were undamaged and operable. The secondary damage due to flooding of motor operated pumps and compressors, their controls and regulating equipment as noted in paragraph I rendered them inoperable. However, this flooding could have been easily controlled had the de-watering system been installed and a damage control party able to operate.

2. The loss of the control house which normally houses docking control and communications center, would seriously impair the efficient operation of this dock. However, by means of jury rig telephones and local operation of pumps and valves this dock could continue to function in emergencies.

(b) Effect on gunnery and fire control.

This drydock has no armament.

(c) Effect on personnel and habitability.

1. All personnel stationed on topside would have suffered casualties as a result of radiant heat and bomb blast pressure.

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2. The habitability of the drydock has been impaired due to flooding of 'C' deck in port wingwall, rendering the fresh water pumps, sanitary pumps and refrigeration machinery inoperable. However, had the de-watering system been installed and operable, the flooding could have been easily controlled. Blast damage in crews messing and berthing spaces was such as to render them not livable without repairs, all of which were within the capacity of the docks force.

(e) Total effect on fighting efficiency.

This drydock has no armament. It's efficiency as a drydock has been considerably reduced from an electrical viewpoint due to the loss of the control house, which if completed would have housed the necessary controls and communications for operation of the dock.

IV. General Summary of Observers Impressions and Conclusions.

This drydock was subjected to a flash of radiant heat, followed by an air blast pressure of considerable magnitude. Due to the nearness of this dock to the center of the blast, damage received is not unusual considering the rendered to other vessels in the same proximity. The electrical damage suffered by this dock is well within the capacity of the forces afloat to repair. Had a complete crew been onboard and the de-watering system been installed the flooding could have been controlled and electrical equipment on 'C' deck in port wingwall would not have been impaired. It is the opinion of the observer that had the electrical installation been complete very little additional damage would have resulted, except for the electrical equipment housed in the control house which would have been completely destroyed.

V. Recommendations.

None.

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DETAILED DESCRIPTION OF ELECTRICAL DAMAGE

A. General Description of Electrical Damage.

(a) Overall condition.

1. This drydock was approximately 60% complete. The main electric plant, distribution switchboard, power and lighting distribution panels, compartment lighting, diesel engine auxiliaries, fresh water pumps, saltwater pumps for sanitary system, refrigeration and galley equipment were installed and operable. The electrical equipment associated with communications and docking operations was approximately 20% complete and inoperable at time of test.

2. The main ships service plant consisting of two 125 K. V. A. Delco, diesel driven generators, distribution switchboard, power and lighting distribution panels and diesel engine auxiliaries located in starboard wingwall were undamaged and operable. Secondary damage due to flooding of power and lighting distribution panels, motors, their controls and regulating equipment for fresh water pumps, saltwater pumps, air compressors, refrigeration compressors and portable welding generator set, all located on 'C' deck in port wingwall rendered these units inoperable. Had the de-watering equipment been installed and a damage control party able to operate the flooding could have been easily controlled.

3. The control house located on 'A' deck of starboard wingwall was blown over side of dock. Foundations for 12 inch signal searchlight and 500 watt floodlights were destroyed. Pipe stanchion supports for capstan control switches were deflected downward by blast pressure. Blast pressure entering wingwalls through open vents caused general dislodging of gear in crews messing and berthing spaces, galley, laundry and sick bay, located on port 'B' deck.

(b) Areas of major damage.

1. Top of wingwalls.

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2. Port and Starboard 'B' decks.
3. Port 'C' deck.
- (c) Primary causes of damage in each area of major damage.
 1. Blast pressure.
 2. Blast pressure.
 3. Flooding.
- (d) Effect of target test on overall operation of electric plant.
 1. Ship's service generator plant: Undamaged and operable.
 2. Diesel Engine Auxiliaries: Undamaged and operable.
 3. Electrical propulsion: Not applicable (designed to be towed).
 4. Communications: Not installed.
 5. Fire control circuits: Not applicable (drydock has no armament).
 6. Ventilation: The ventilation installation was incomplete. Eight local supply vents were installed on port and starboard 'B' decks. One vent motor was blown off foundation located at frame 41-1/2 port. The other sets were undamaged and operable.
 7. Lighting: The lighting system was only slightly damaged. Had flooding been controlled the entire system would have been operable with only minor repairs.

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(e) Types of equipment most affected.

Docking control equipment and communications on 'A' decks and in docking control house.

B. Electric Propulsion Rotating Equipment.

Not applicable.

C. Electric Propulsion Control Equipment.

Not applicable.

D. Ship's Service Generators.

No damage.

E. Emergency Generators.

Not applicable.

F. Switchboards, Distribution and Transfer Panels.

1. Except for dislodging of fuses there was no damage to the switchboard or distribution panels.

2. The flooding of port 'C' deck caused secondary damage to wiring and interior of three distribution panels. Had this dock been 100% complete and a damage control party able to operate the flooding could have been easily controlled.

G. Wiring, Wiring Equipment and Wireways.

Except for secondary damage due to flooding, there was no mechanical damage to any of the wiring or wiring equipment.

H. Transformers.

No damage.

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I. Submarine Propelling Batteries.

Not applicable.

J. Portable Batteries.

No damage.

K. Motors, Motor Generator Sets and Motor Controllers.

(a) Rotating equipment.

The motors for the following units located on 'G' deck in port wingwall were rendered inoperable due to flooding, but received no mechanical damage as a direct result of the test:

1. Fresh water pumps Nos. 1 and 2 at frame 33-34.
2. Fresh water tank air compressor at frame 34-35.
3. Saltwater pumps Nos. 1 and 2 at frame 41-42.
4. Saltwater tank air compressor at frame 40-41.
5. Refrigeration compressor Nos. 1 and 2 at frame 23-24.
6. Portable welding generator set.

(b) Control equipment.

The controllers and regulating equipment for motors listed under Item K above were rendered inoperable due to flooding but received no mechanical damage as a direct result of the test.

L. Lighting Equipment.

The compartment lighting fixtures were Crouse Hinds, commercial type.

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(a) Lamps (Rough Service - Rough Service High Impact).

None installed.

(b) Reflectors.

None installed.

(c) Fixture mounts.

The mounting brackets for three 500 watt floodlights located 'A' decks, frame 38 port and 38 and 50 starboard were destroyed by blast pressure.

(d) Shock mounts.

None installed.

(e) Pendant lamp holders.

None installed.

(f) Lamp globes.

The globe for the port stern light located at frame 56 was broken by blast pressure.

M. Searchlights.

No searchlights were installed at time of test. A pipe stanchion foundation for one 12 inch searchlight was destroyed by blast pressure.

N. Degaussing Equipment.

Not applicable.

O. Gyro Compass Equipment.

Not applicable.

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P. Sound Powered Telephones.

Not applicable.

Q. Ship's Service Telephones.

Not applicable.

R. Announcing Systems.

Not applicable.

S. Telegraphs.

Not applicable.

T. Indicating Systems.

Not applicable.

U. I. C. and A. C. O. Switchboards.

Not applicable.

V. F. C. Switchboards.

Not applicable.

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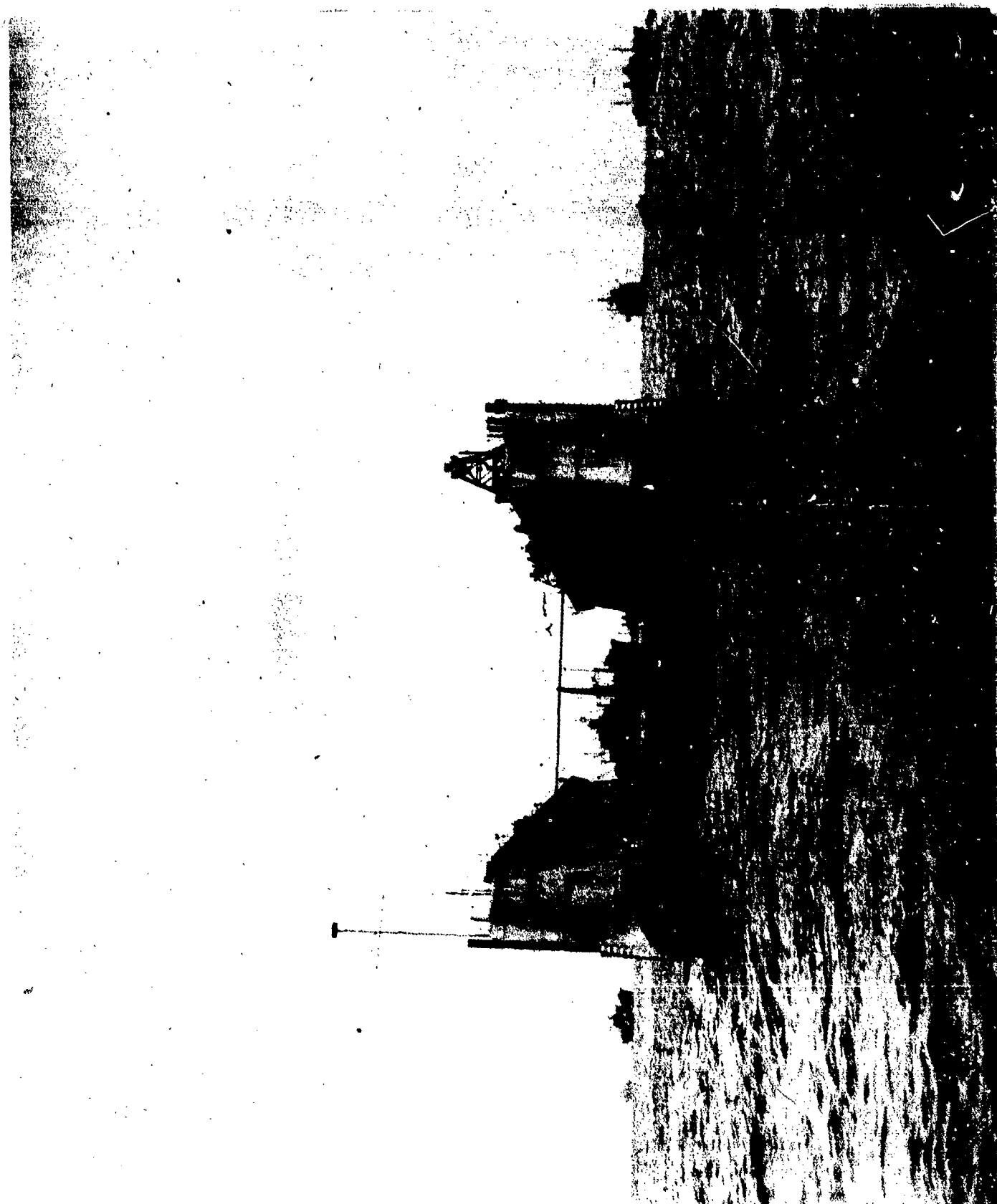
SECTION IV

PHOTOGRAPHS

TEST ABLE

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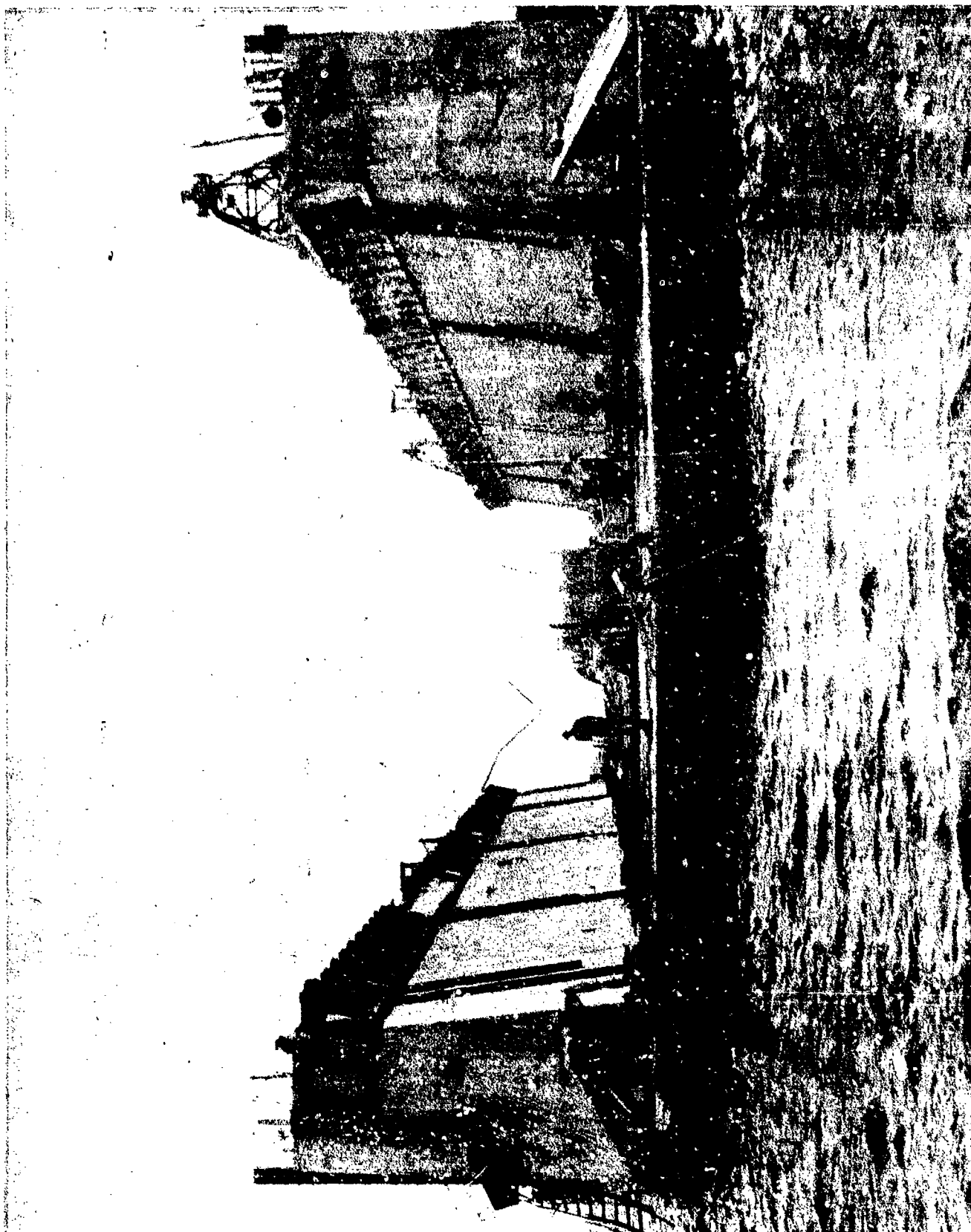
BA-CR-65-106-5. View from dead ahead before Test A.

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AA-CR-227-50-132. View from dead ahead after Test A.

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BA-CR-65-106-6. View from off port bow before Test A.

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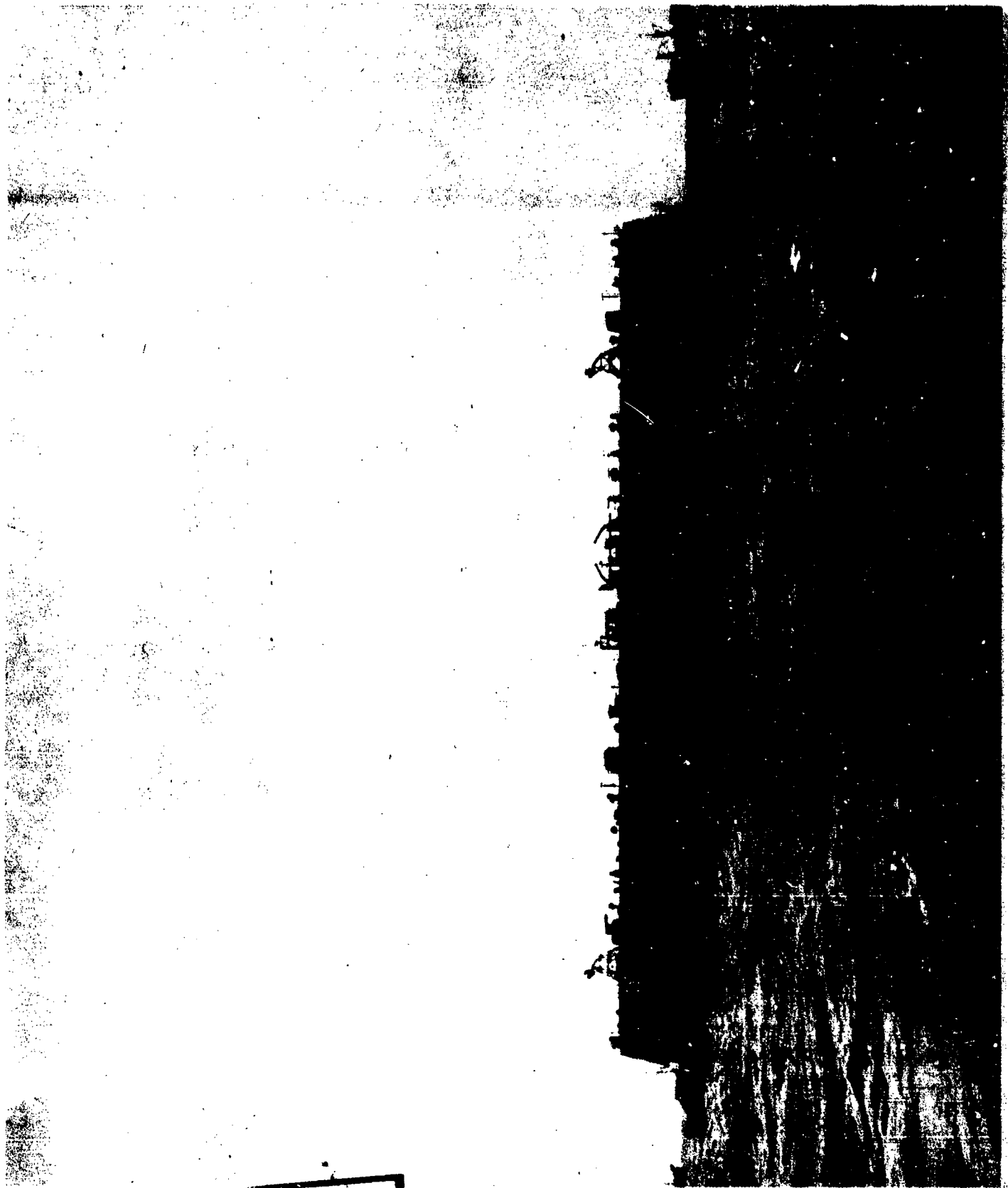
AA-CR-227-50-133. View from off port bow after Test A.

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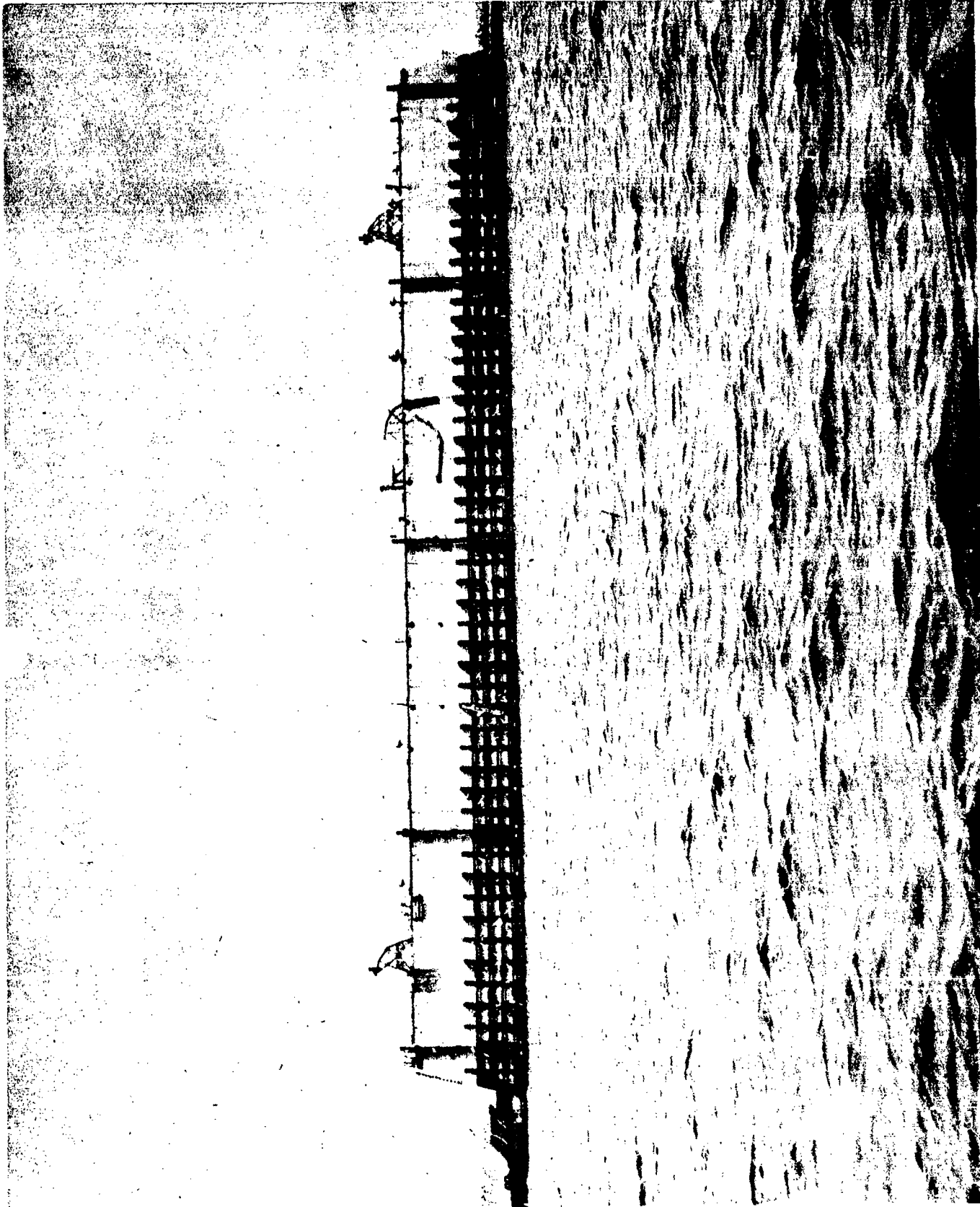
BA-CR-65-106-7. View from off port beam before Test A.

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AA-CR-227-50-134. View from off port beam after Test A.

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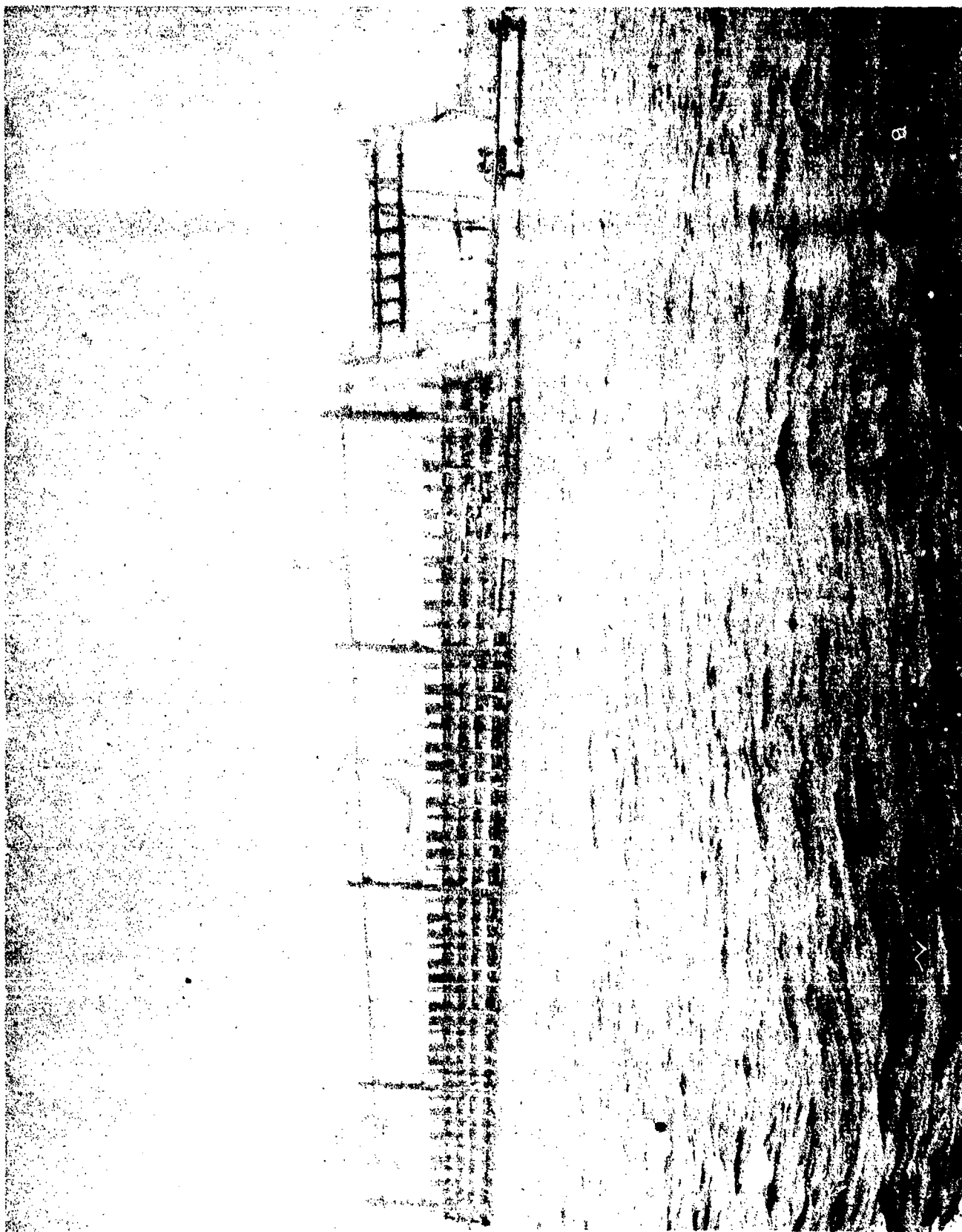
BA-CR-65-106-8. View from off port quarter, before Test A.

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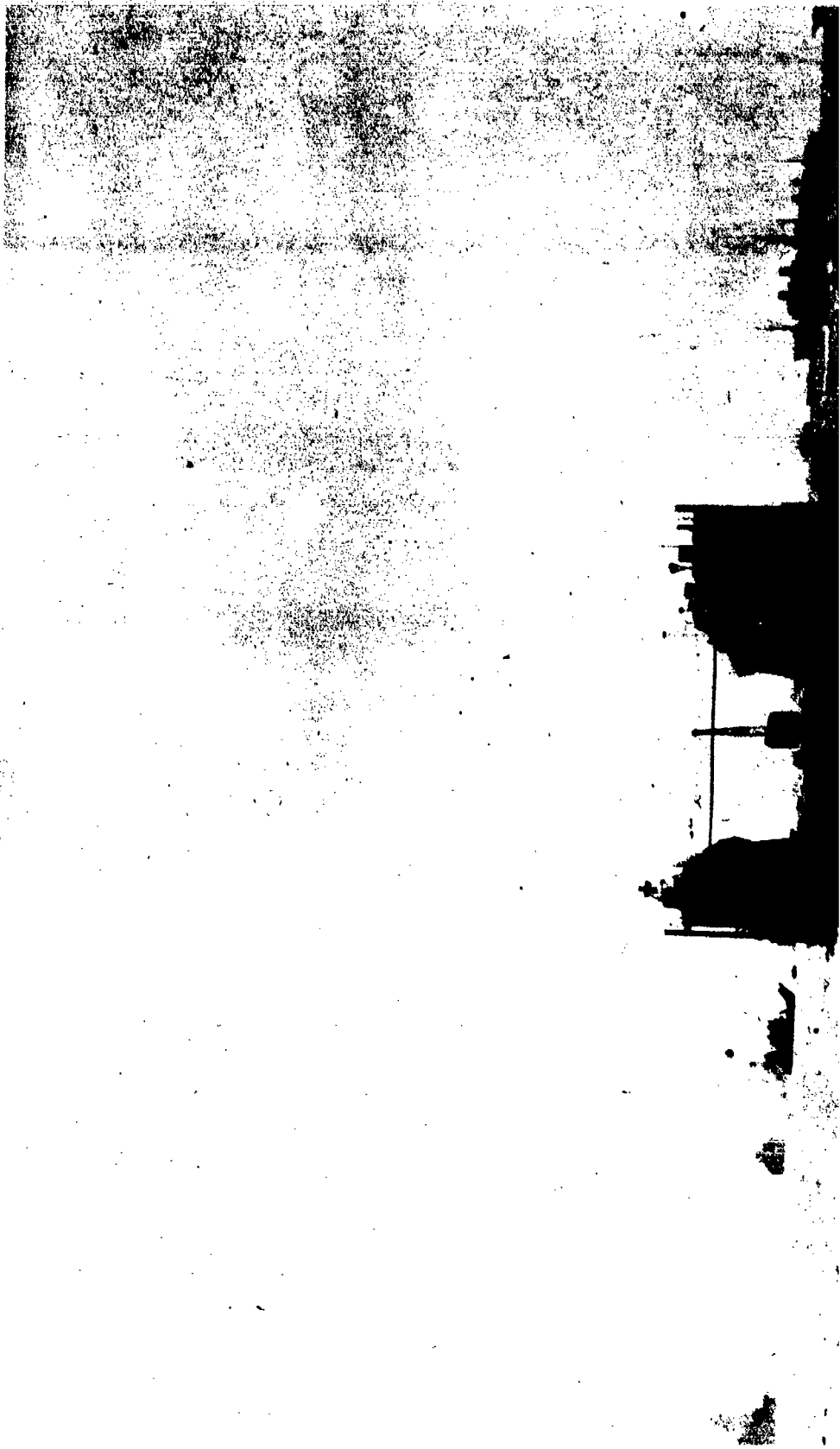
AA-CR-227-50-135. View from off port quarter after Test A.

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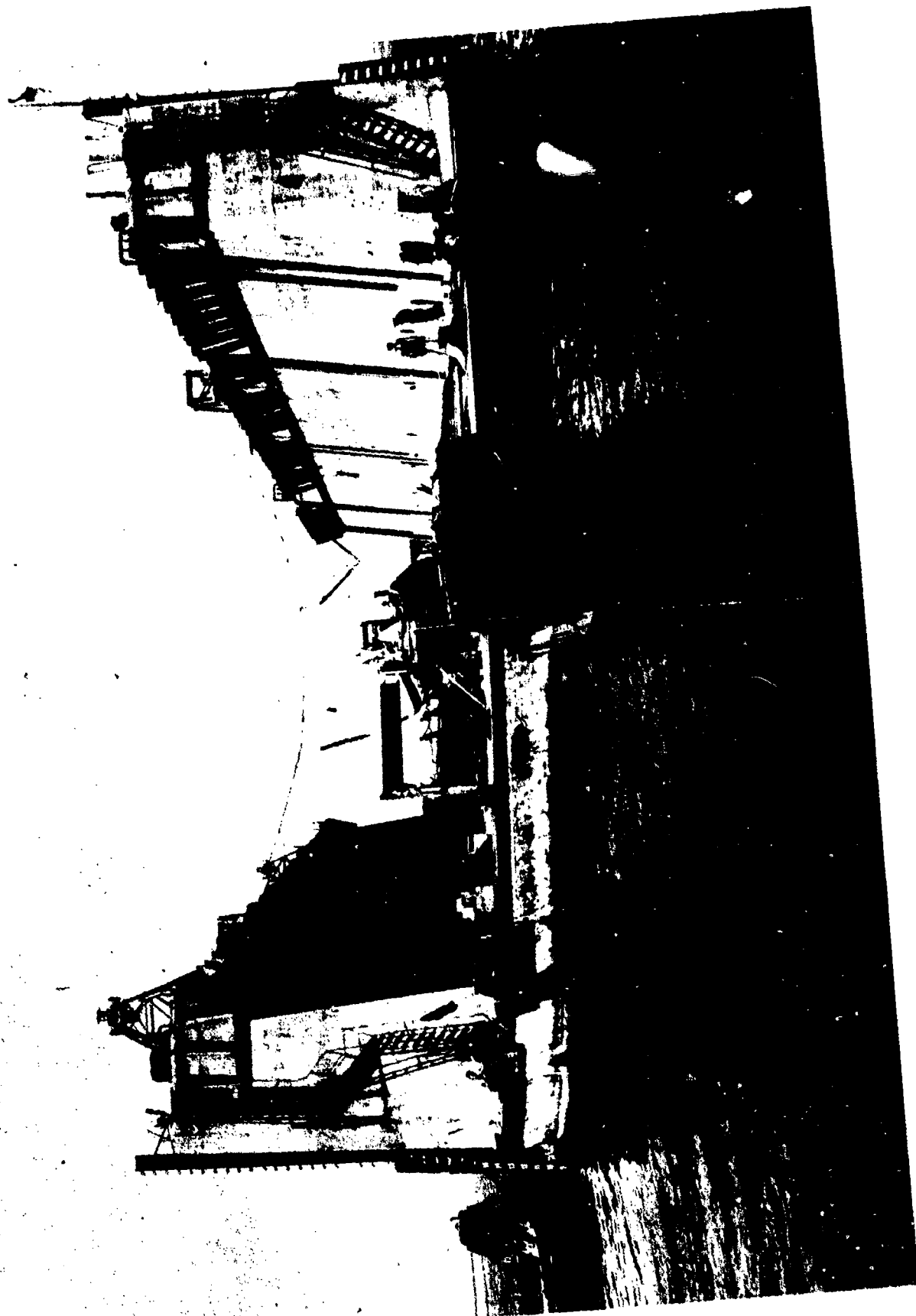
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BA-CR-65-106-9. View from astern before Test A

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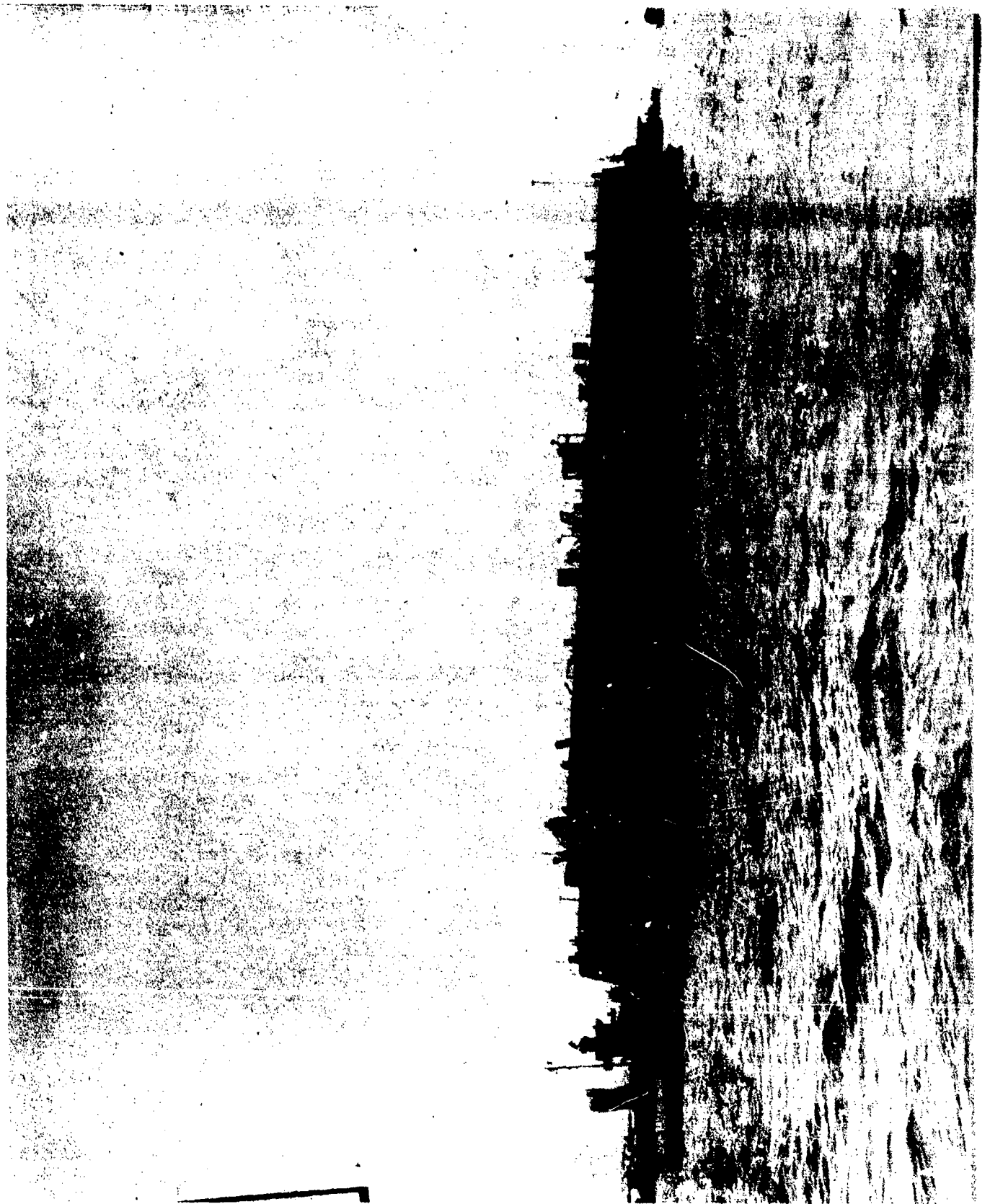
AA-CR-227-50-128. View from astern after Test A.

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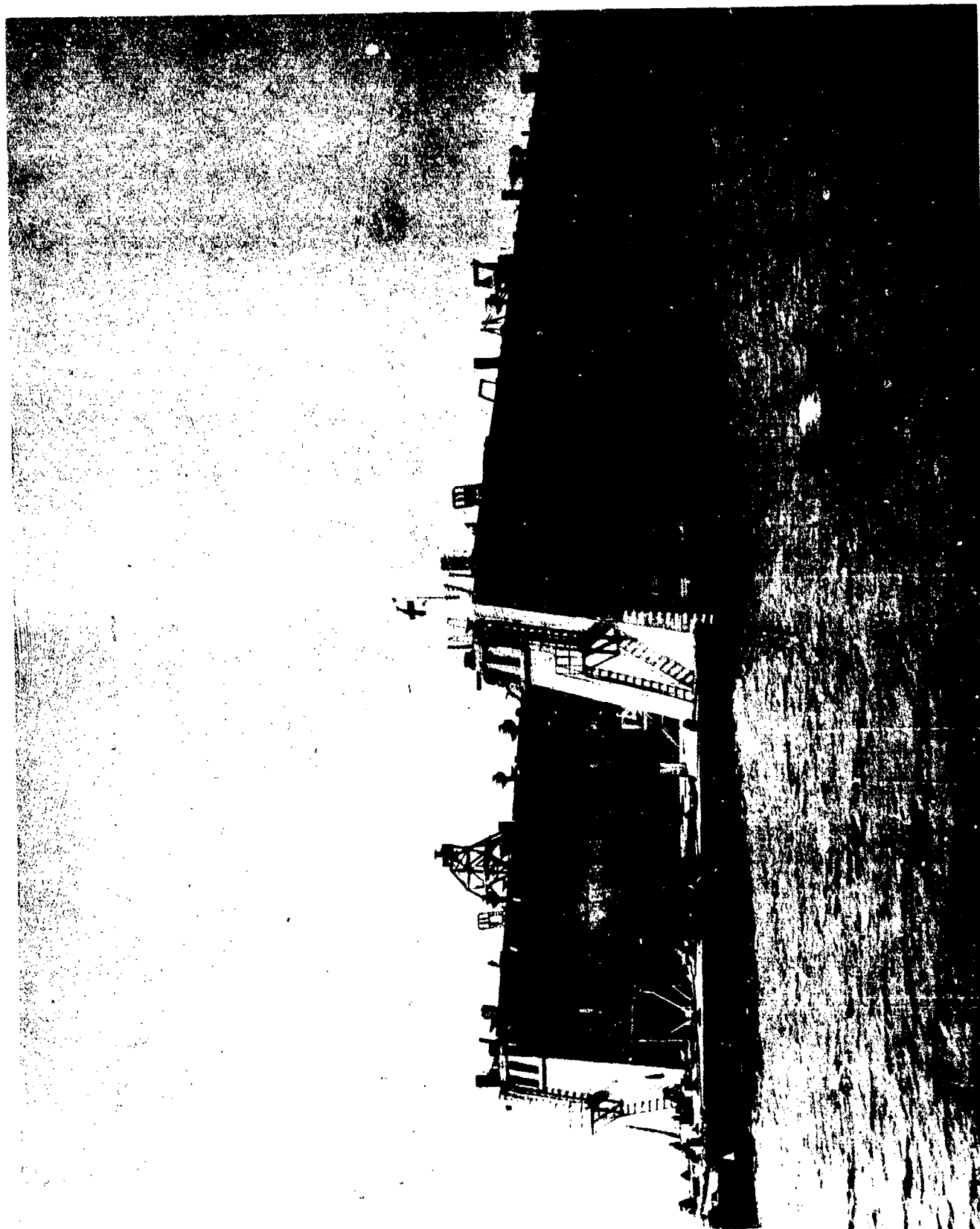
BA-CR-65-106-12. View from off starboard quarter before Test A.

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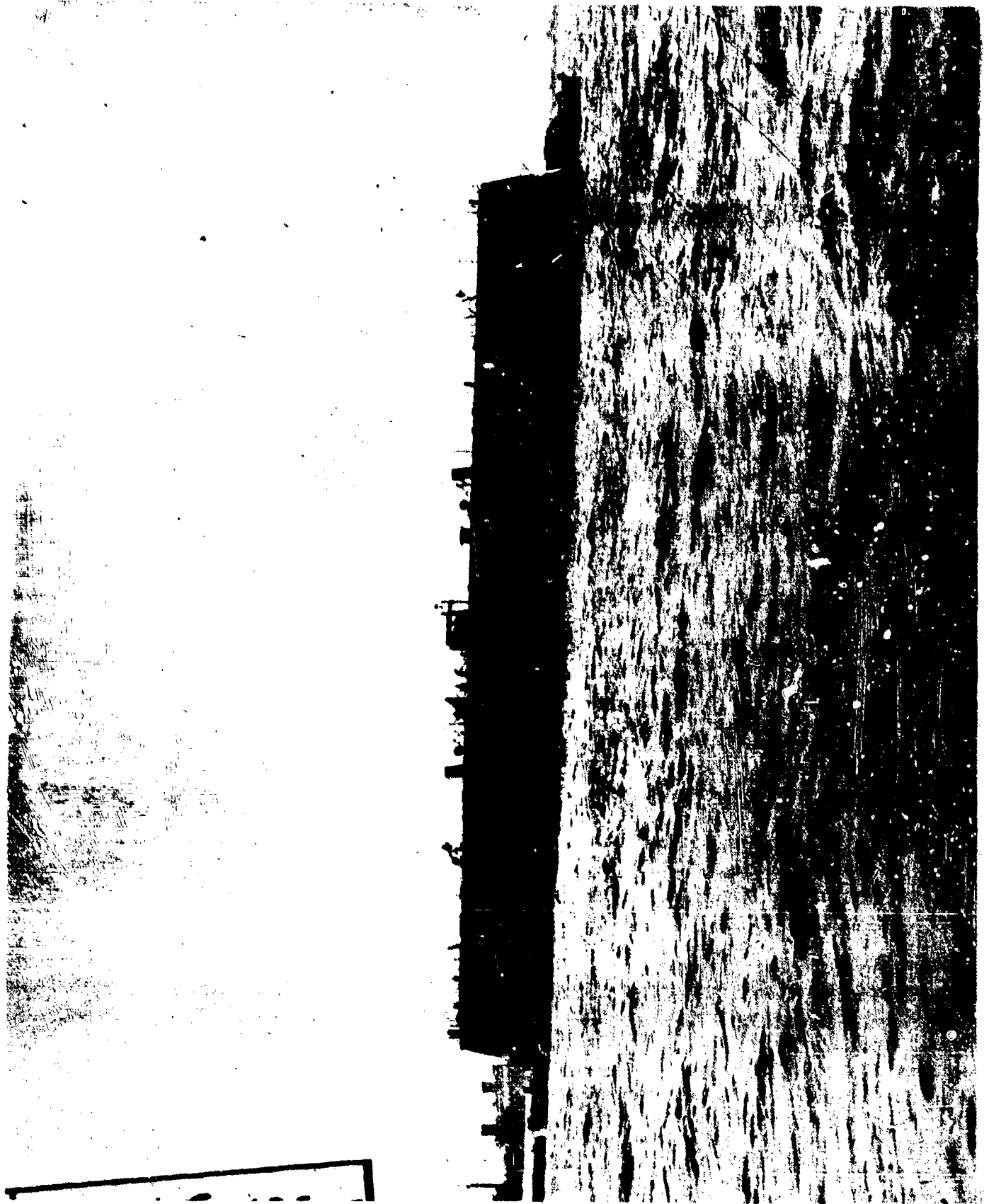
AA-CR-227-50-129. View from off starboard quarter after Test A.

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BA-CR-65-106-11. View from off starboard beam before Test A.

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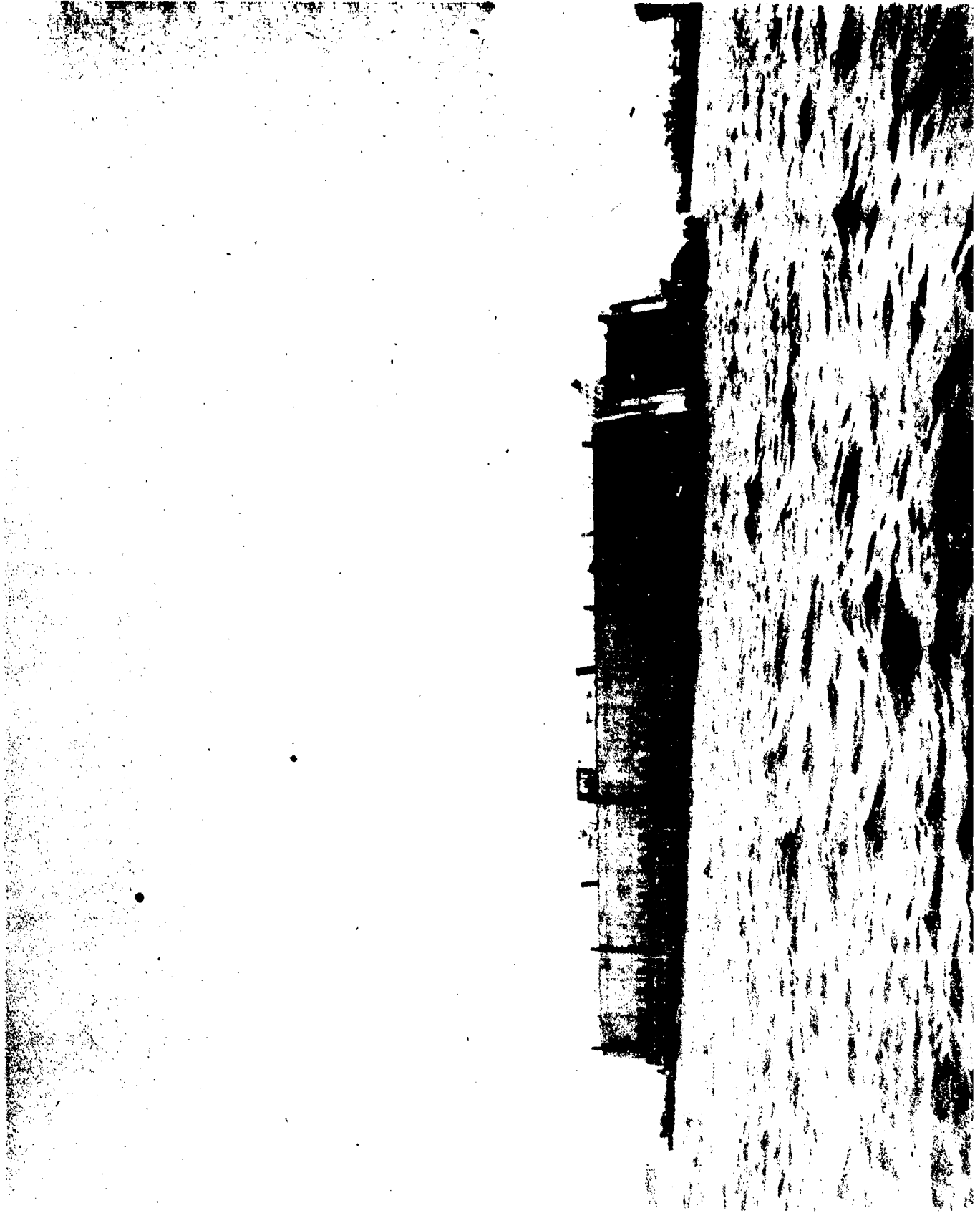
AA-CR-227-50-130. View from off starboard beam after Test A.

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BA-CR-65-106-10. View from off starboard bow before Test A.

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AA-CR-227-50-131. View from off starboard bow after Test A.

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AA-CR-98-1963-7. View looking forward along the port side of the deck floor.

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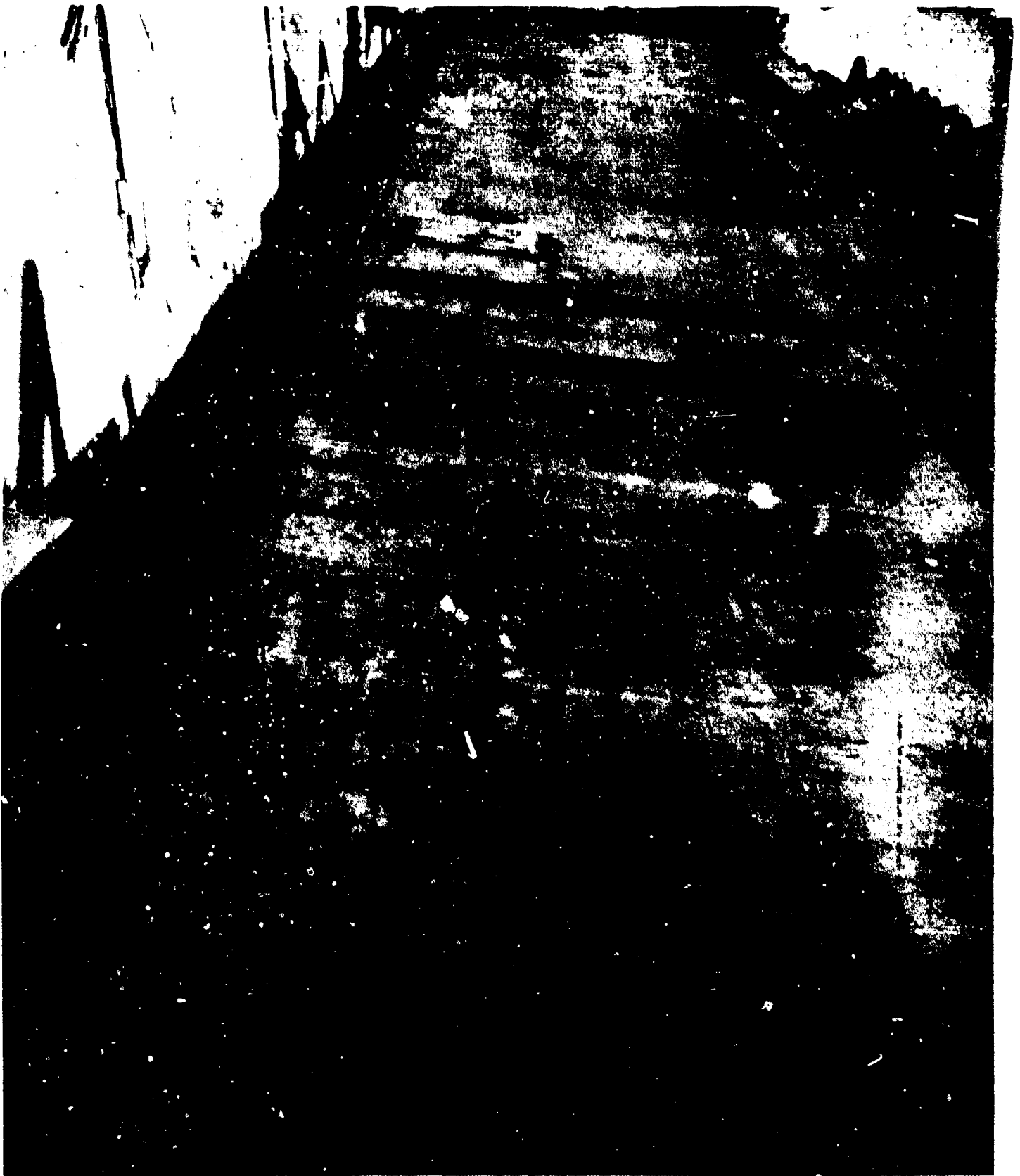
AA-CR-98-1963-9. View looking aft from starboard side of deck floor showing damage to caterpillar crane.

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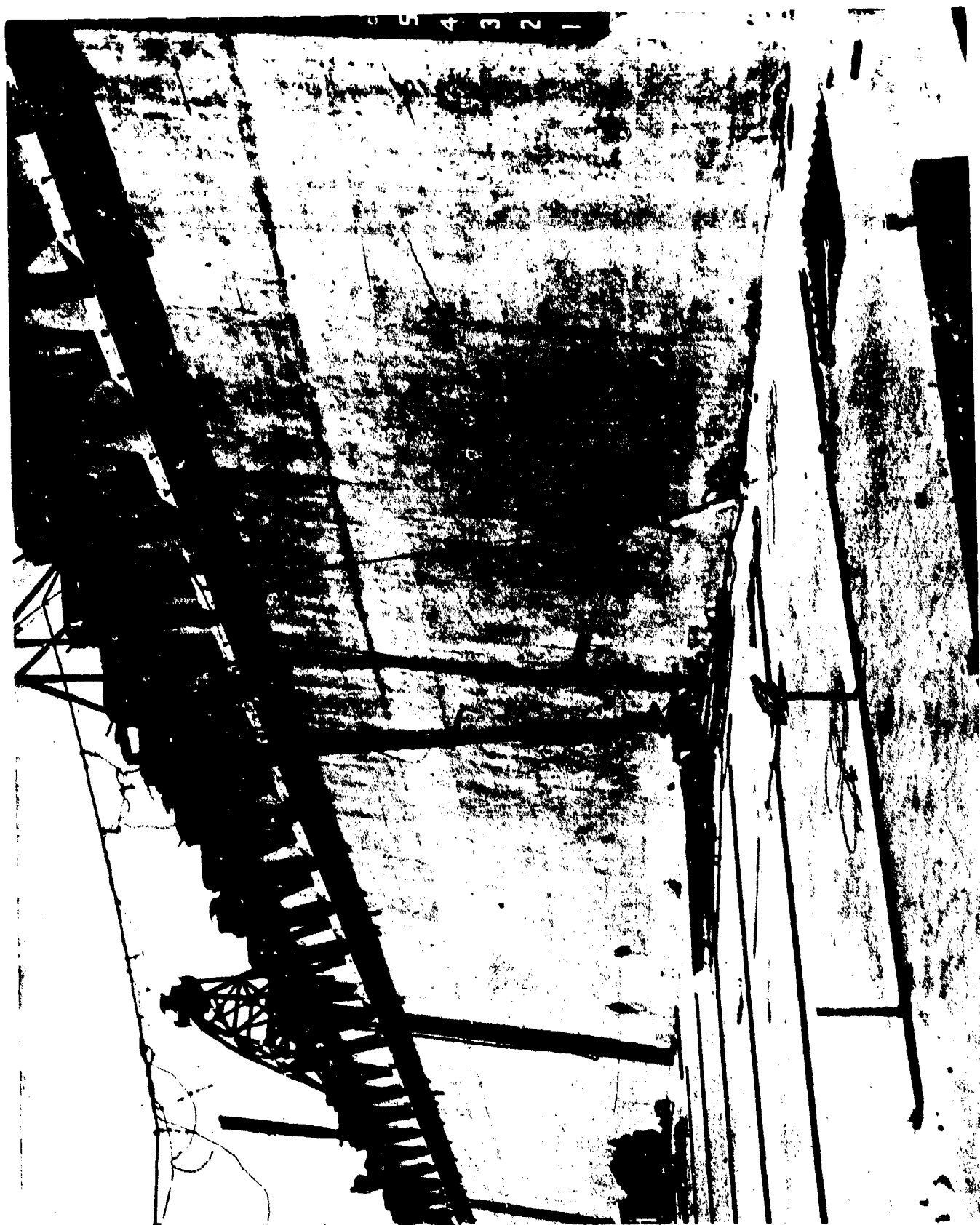
AA-CR-82-1916-2. View looking forward along starboard wing wall, showing light longitudinal crack just above blanked off opening.

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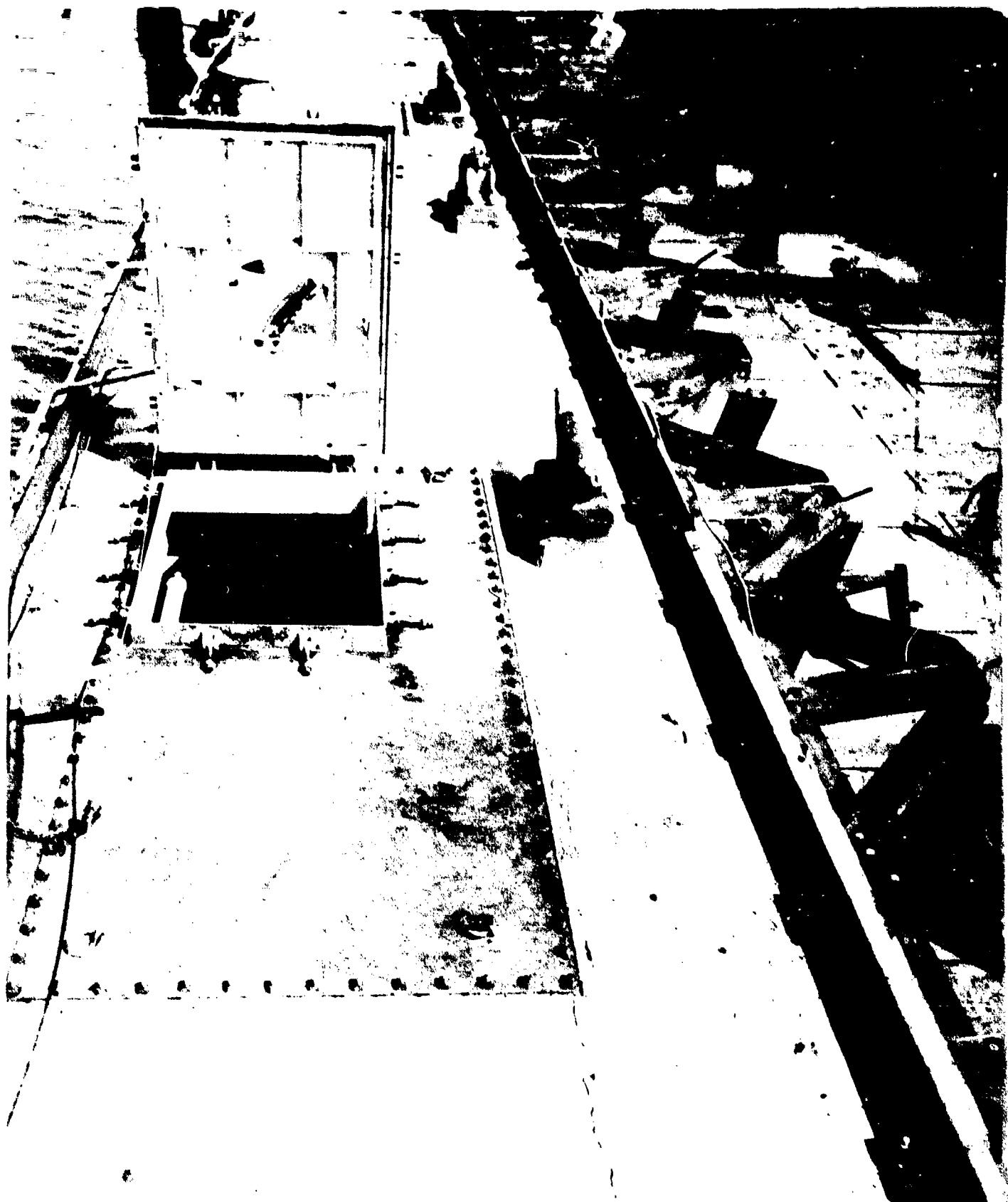
AA-CR-82-1914-11. View looking aft along port wing wall showing longitudinal cracks at about mid-height of wall.

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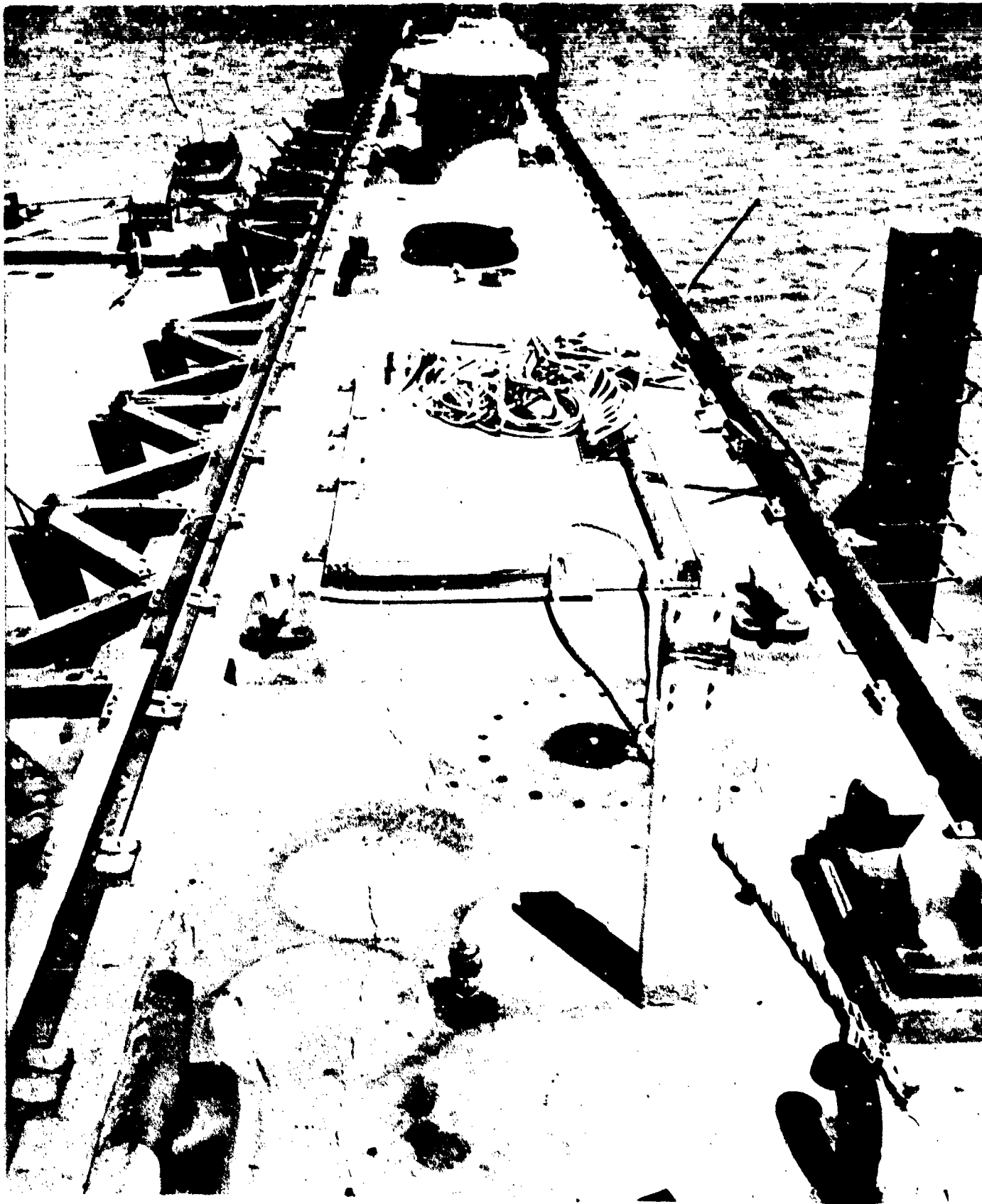
AA-CR-82-1914-4. View looking forward, port side, showing crack in "A" deck.

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AA-CR-82-1916-1. View looking forward, starboard side, showing crack in "A" deck.

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AA-CR-98-1963-5. View of crack in after inside face of starboard wing wall.

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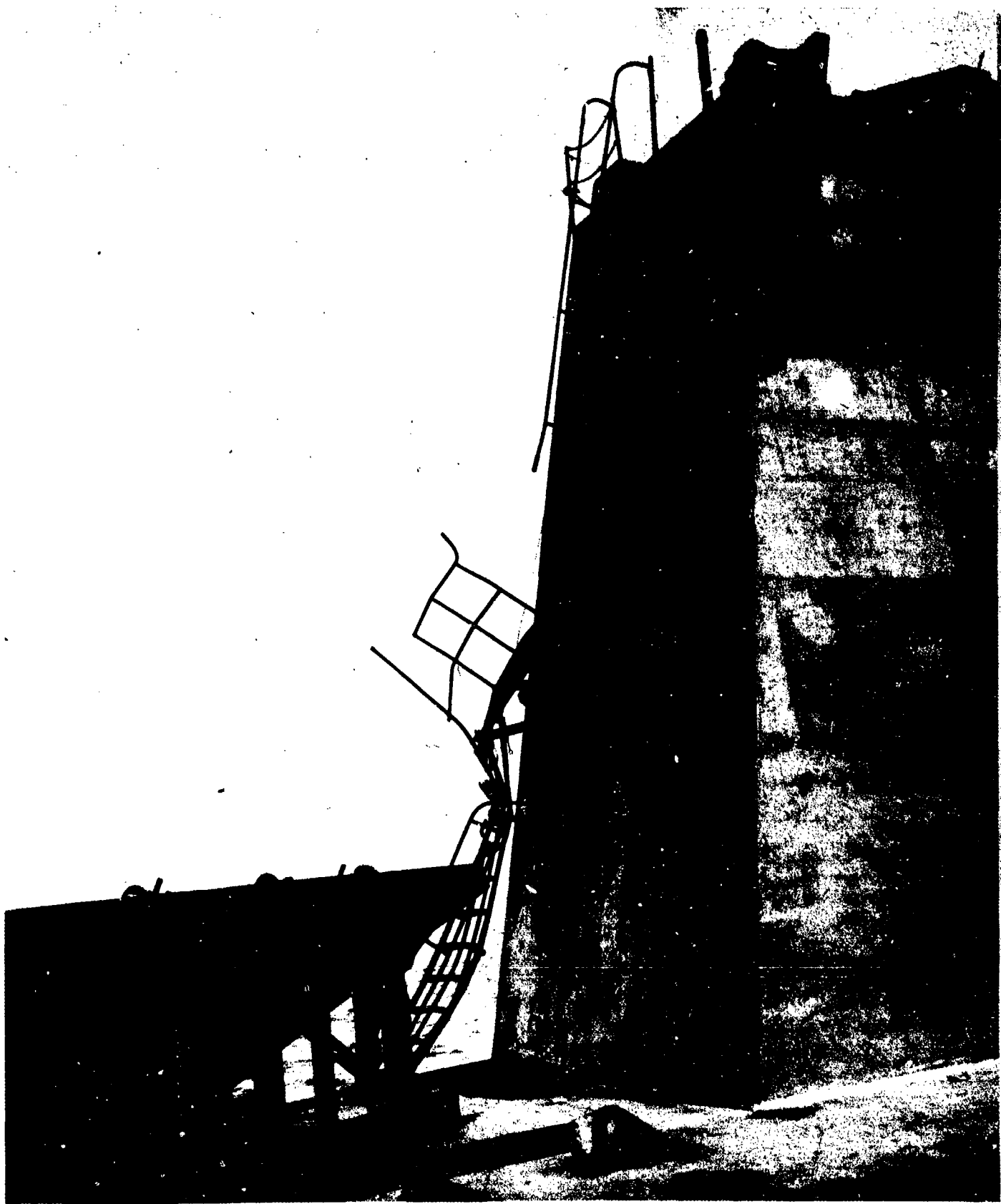
AA-CR-98-1964-6. Exterior view of bow after Test A.

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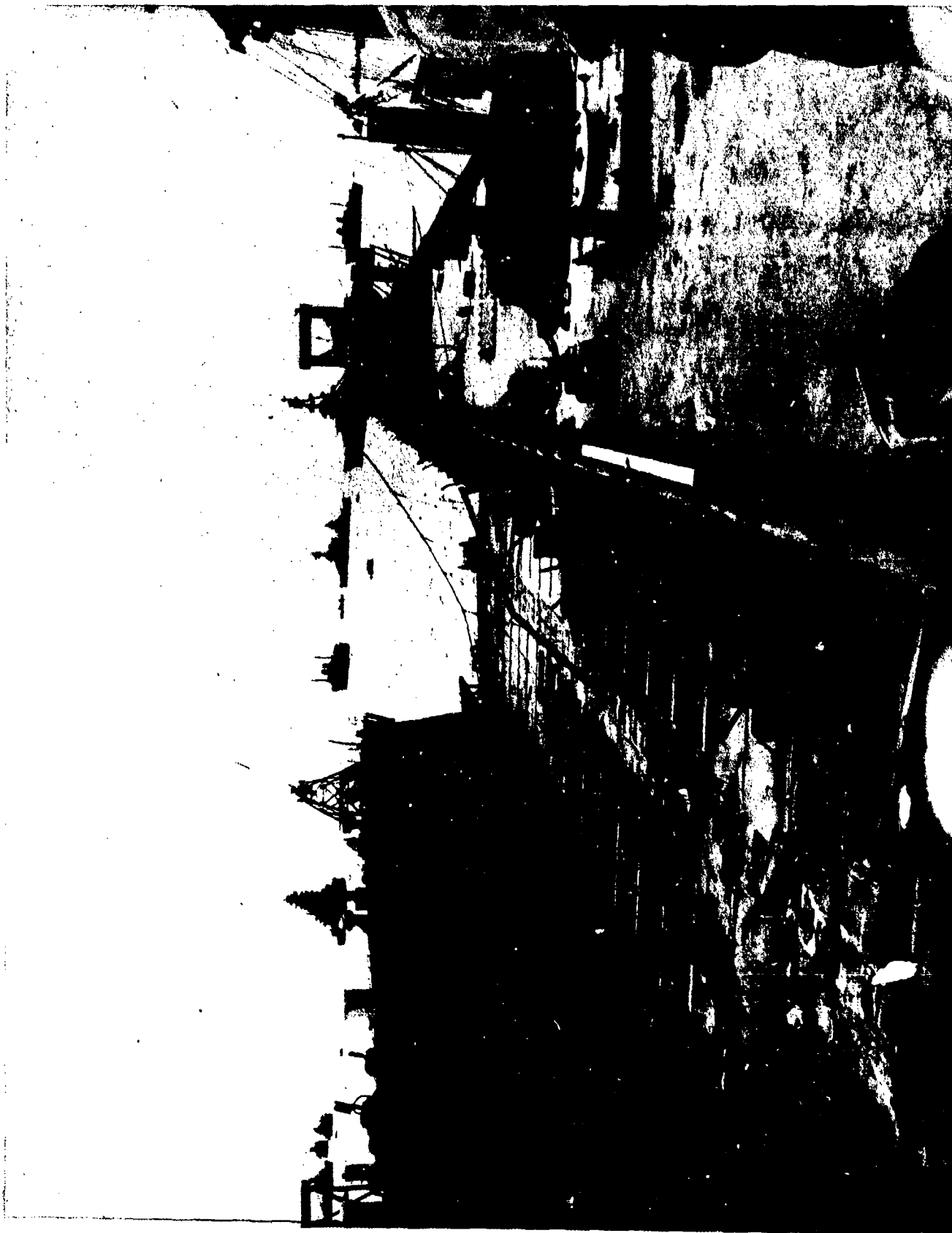
AA-CR-98-1963-11. View of damage to ladder on forward face of starboard wing wall.

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AA-CR-98-1962-10. View looking forward from top of starboard wall.

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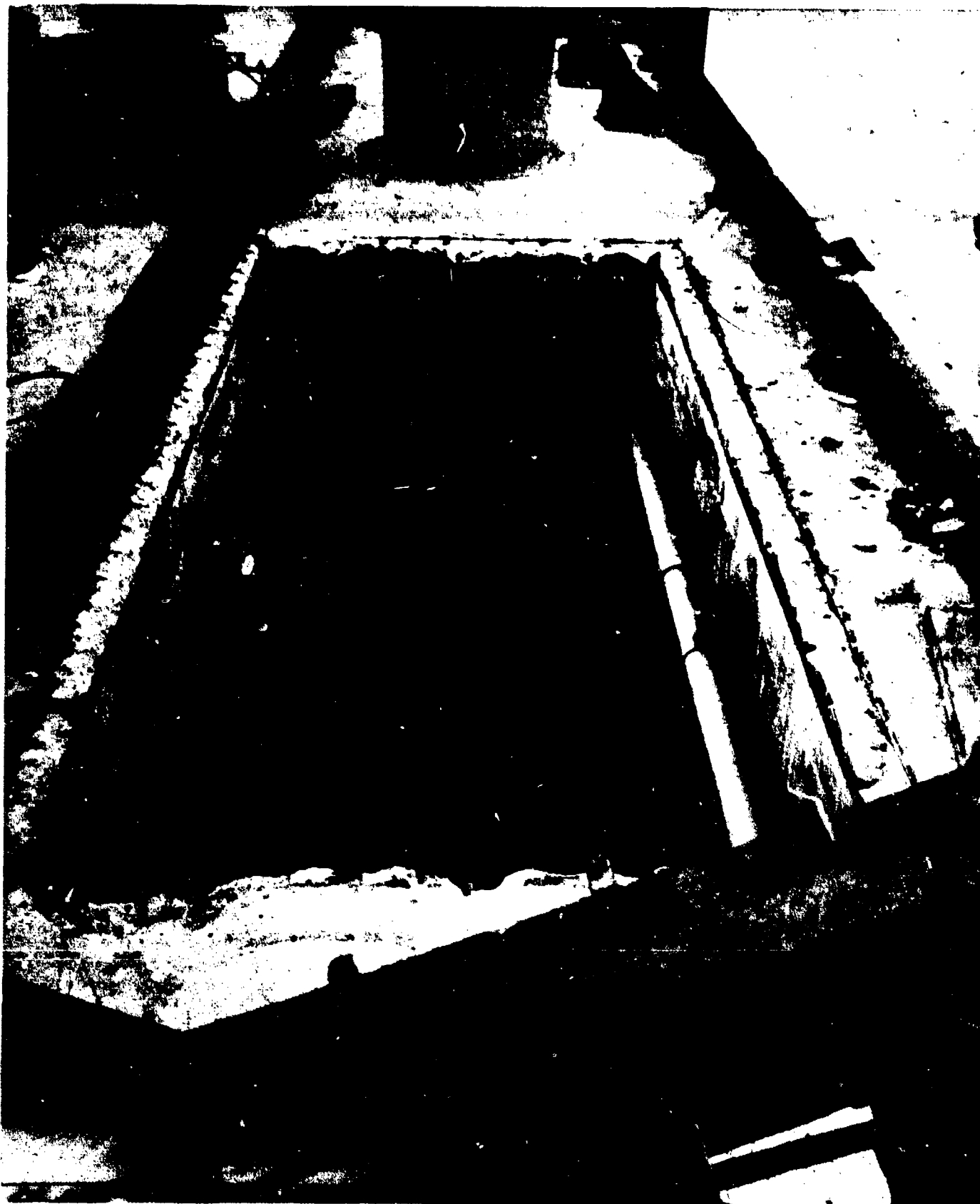
AA-CR-98-1963-12. Looking aft along starboard wing wall.

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AA-CR-98-1964-2. View looking aft at engine room hatch opening in port "A" deck. The cover plate and hatch are missing - see 1914-4 for typical installation.

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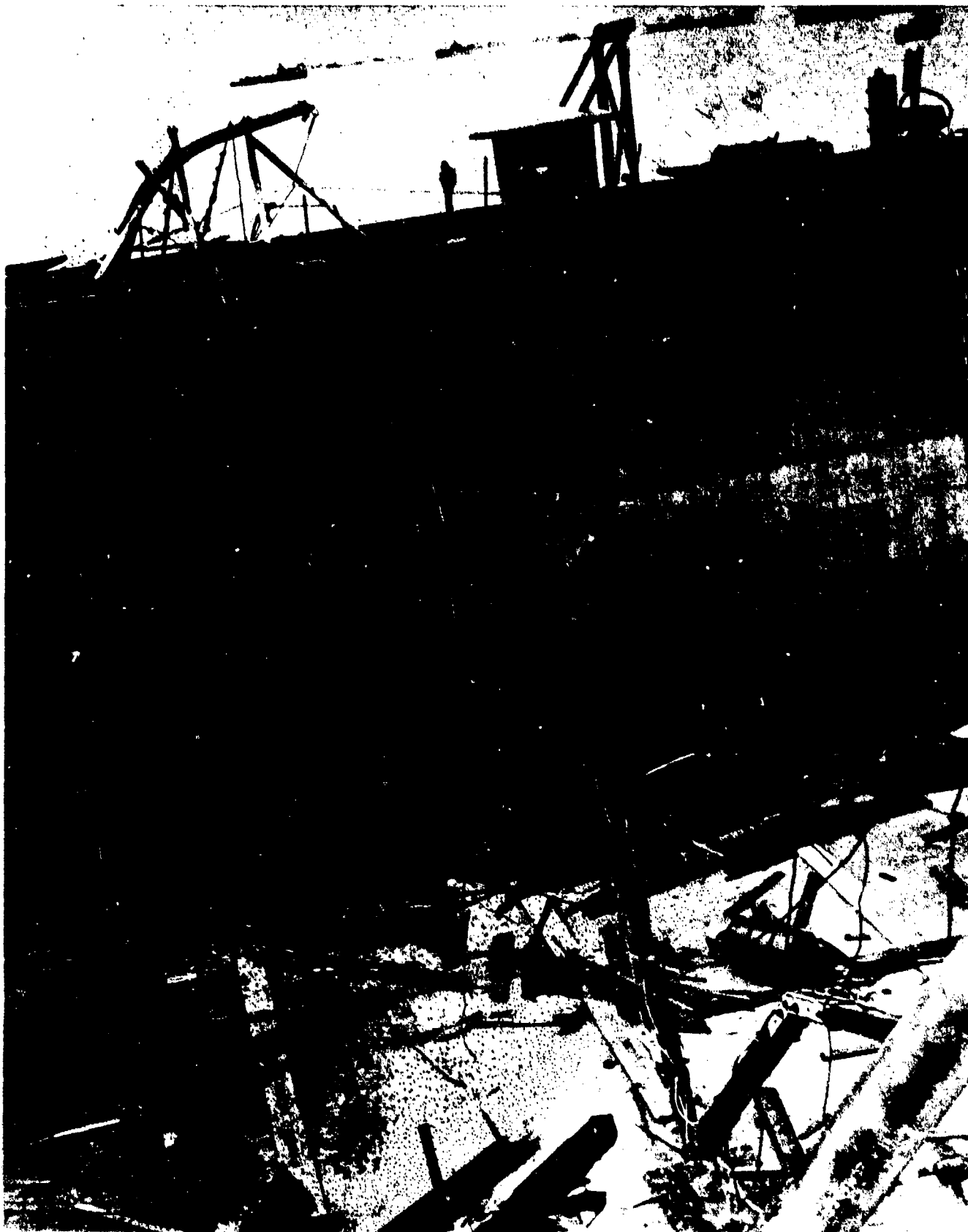
AA-CR-98-1962-7. View looking aft showing after deck floor and port wing wall.

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AA-CR-98-1962-9. View looking athwartship and damage to catwalk and starboard wing wall amidships.

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AA-CR-98-1964-1. View of crack in port "A" deck.

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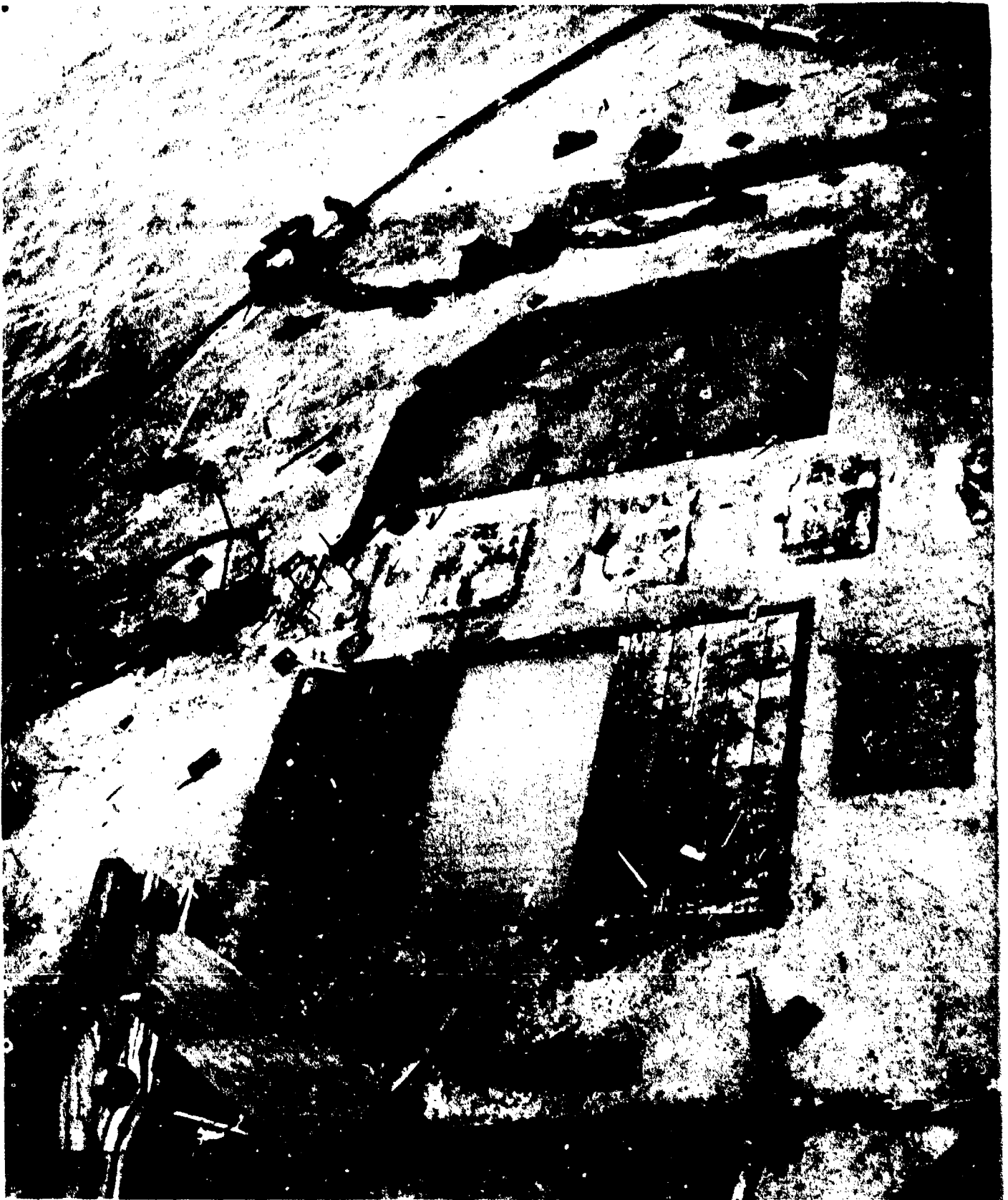
AA-CR-82-1914-12. View showing damage in way of ventilator on starboard "A" deck.

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AA-CR-98-1962-11. View looking down upon dock floor, stern, from top of starboard wing wall.

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AA-CR-98-1964-3. Looking aft along dock floor at starboard propeller pit, the wooden cover is missing.

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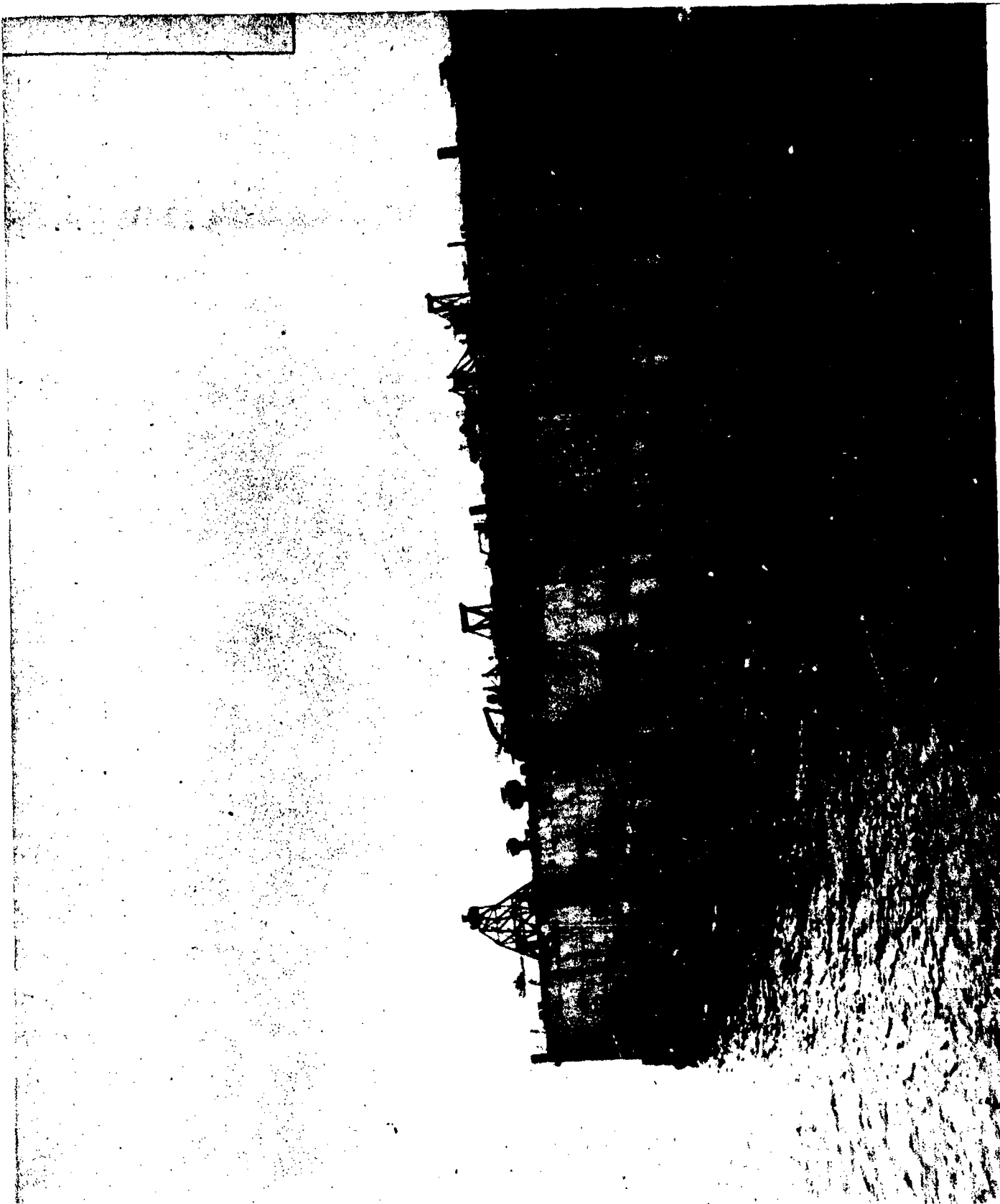
AA-CR-98-1963-2. View of stern edge of dock floor, showing remains of torpedo tube and spoon.

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AA-CR-98-1964-10. View of exterior face of port wing wall looking
aft from off port bow.

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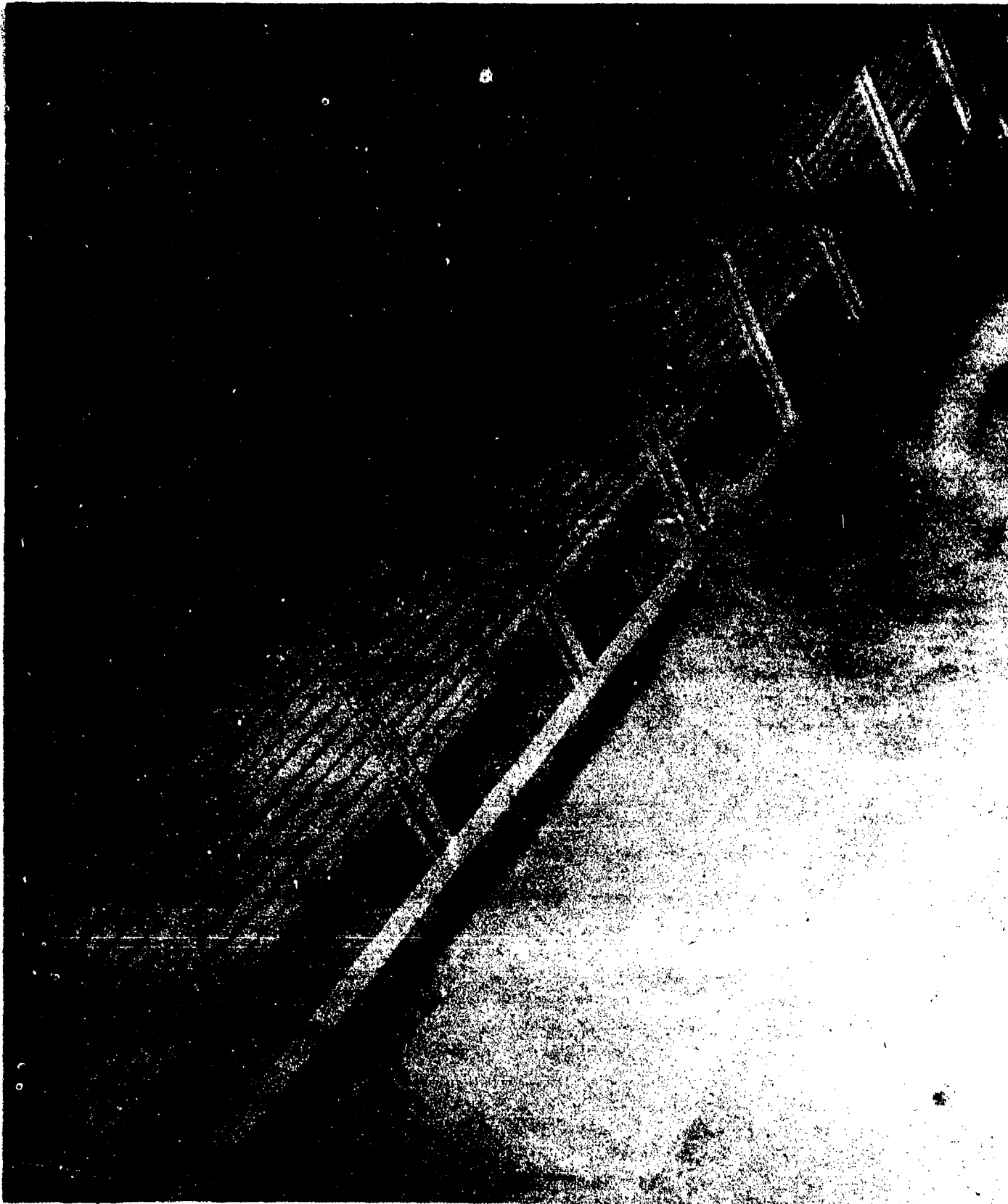
AA-CR-32-1914-6. Typical damage is shown at the base of frame 39, port side, looking forward.

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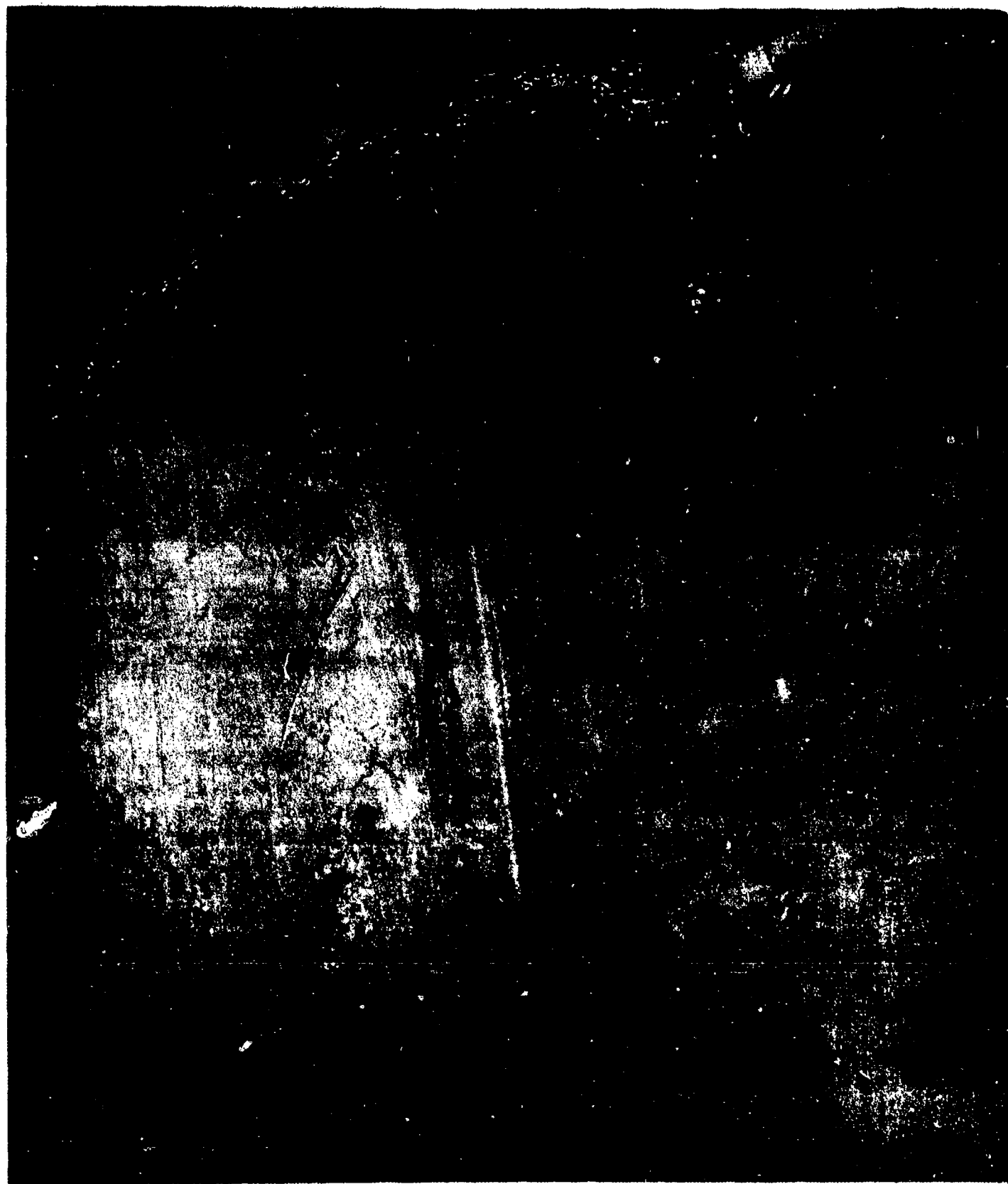
AA-CR-82-1914-7. View of damage to deck beams under "A" deck, frame 26.

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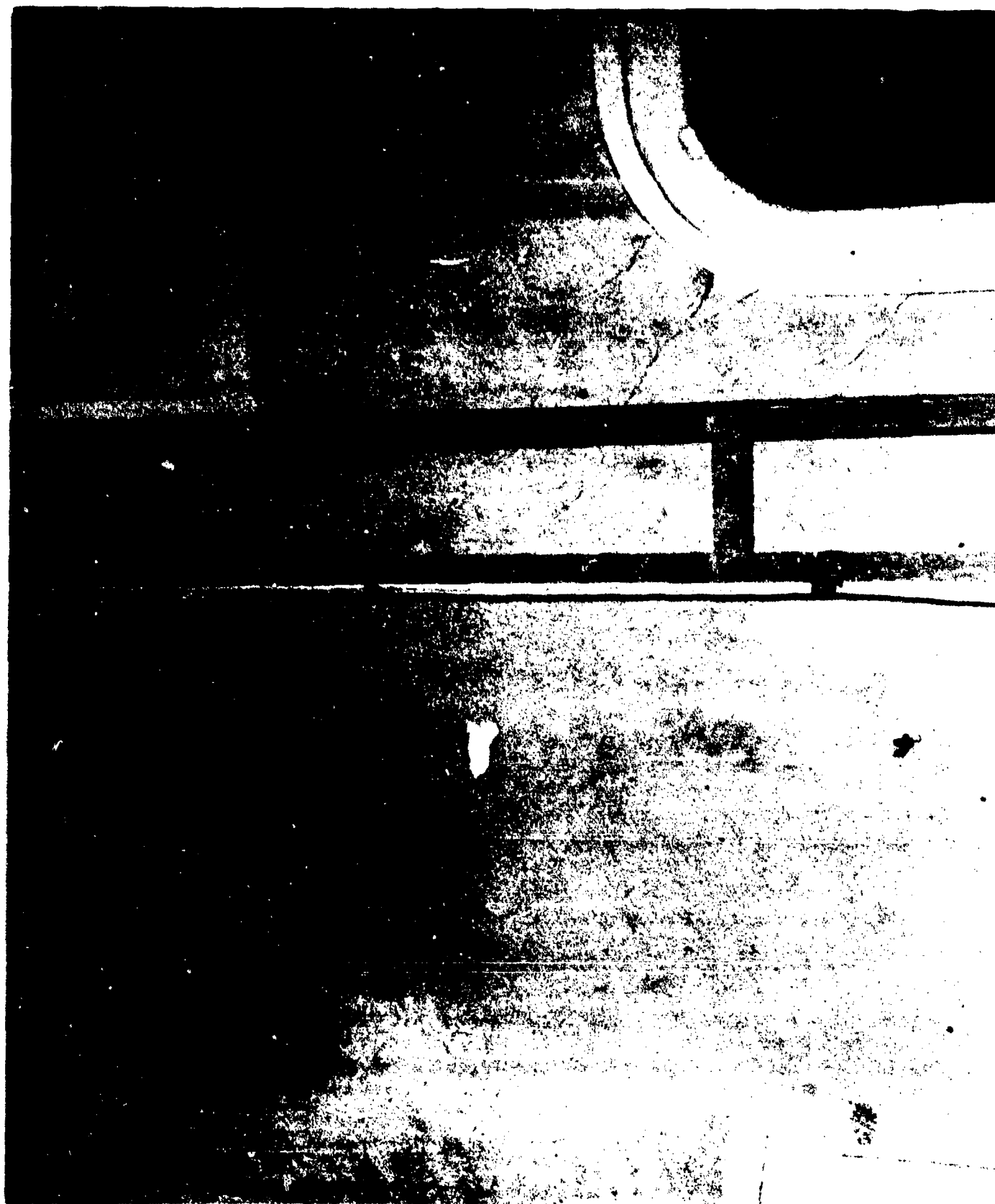
AA-CR-82-1914-10. View of crack at frame 16, port side, between
"A" and "B" decks.

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AA-CR-82-1914-8. View of cracks in port side of bulkhead 19, between "A" and "B" decks, looking forward.

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AA-CR-82-1914-5. View of cracks near door frame in port side of transverse bulkhead 44, between "A" and "B" decks.

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AA-CR-82-1914-9. View showing damage to ventilator fan installation, port side, at about frame 40 1/2.



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Defense Special Weapons Agency
6801 Telegraph Road
Alexandria, Virginia 22310-3398

TRC

18 April 1997

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER
ATTENTION: OMI/Mr. William Bush (Security)

SUBJECT: Declassification of Reports

The Defense Special Weapons Agency has declassified the following reports:

/✓AD-366588 4	XRD-203-Section 12✓
AD-366589 L	XRD-200-Section 9
AD-366590 L	XRD-204-Section 13
AD-366591 L	XRD-183
/✓AD-366586 X	XRD-201-Section 10✓
/✓AD-367487 4	XRD-131-Volume 2✓
✓✓AD-367516 4	XRD- 13 143✓
✓✓AD-367493 4	XRD-142✓
AD-801410L✓	XRD-138✓
AD-376831L✓	XRD-83✓
AD-366759 L	XRD-80
✓✓AD-376830L 4	XRD-79✓
/✓AD-376828L 4	XRD-76✓
/✓AD-367464 X	XRD-106✓
AD-801404L✓	XRD-105-Volume 1✓
/✓AD-367459 X	XRD-100✓

TRC

18 April 1997

Subject: Declassification of Report

AD-376836L ✓	XRD-98 ✓
AD-376835L ✓	XRD-97 ✓
AD-376834L ✓	XRD-96 ✓
AD-376833L ✓	XRD-95 ✓
X AD-376832L ✓	XRD-94 ✓ <i>re-ingest</i>
✓✓ AD-367458 ✓	XRD-93 ✓
AD-367457 ✓	XRD-92-Volume 2 ✓
AD-367456 ✓	XRD-91-Volume 1 ✓
AD-367455 ✓	XRD-90 ✓
AD-367454 ✓	XRD-89 ✓
AD-367453 ✓	XRD-88 ✓
AD-367452 ✓	XRD-87 ✓
AD-366764 ✓	XRD-86
AD-376837L ✓	XRD-99
AD-366758 ✓	XRD-78
AD-366734 ✓	XRD-44
AD-366763 ✓	XRD-85 ✓
AD-376829L ✓	XRD-77 ✓
✓✓ AD-367462 ✕	XRD-103 ✓
✓✓ AD-367463 ✕	XRD-104 ✓
✓✓ AD-367461 ✕	XRD-102 ✓
AD-367460 ✓	XRD-101 ✓

TRC

18 April 1997

Subject: Declassification of Reports

AD-801406L ✓ XRD-114✓

In addition, all of the cited reports are now **approved for public release; distribution statement "A" now applies.**

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